D1.3/2:6/10

DEFENSE INDUSTRY BULLETIN

UNIVERSITY OF FLORIDA LIBRARIES
OCT 1970
DOCUMENTS DEPT.

OCTOBER 1970

UNIV. OF FLORIDA LIBS.
DOCUMENTS
DEPARTMENT
U.S. DEPOSITORY

DEFENSE INDUSTRY BULLETIN

Vol. 6 No. 10 **October 1970**

Published for Department of Defense by Defense Supply Agency

HON. MELVIN R. LAIRD
SECRETARY OF DEFENSE

LT. GEN. EARL C. HEDLUND, USAF
DIRECTOR, DEFENSE SUPPLY AGENCY

EUGENE F. HART
SPECIAL ASSISTANT, PUBLIC AFFAIRS

ACTING EDITOR
CAPT. FRANK W. KAFER, USAF

EXECUTIVE EDITOR
MRS. CECILIA POLLOK McCORMICK

EDITORIAL, CIRCULATION ASSISTANT
JO2 CHARLES D. WITTMAN, USN

The *Defense Industry Bulletin* is published monthly by the Defense Supply Agency for the Department of Defense. Use of funds approved by the Director, Bureau of the Budget, Nov. 2, 1965.

The *Bulletin* serves as a means of communication between the Department of Defense, its authorized agencies, defense contractors and other business interests. It provides guidance to industry concerning official DOD policies, programs and projects and seeks to stimulate thought on the part of the Defense-Industry team in solving problems allied to the defense effort.

Suggestions from industry representatives concerning possible topics for future issues are welcome and should be forwarded to the Editor at the address shown below.

The *Bulletin* is distributed free of charge to qualified representatives of industry and of the Departments of Defense, Army, Navy, and Air Force. Subscription requests should be submitted on company letterhead, must indicate the title of the requester, and be addressed to: Editor, Defense Industry Bulletin, Hq., Defense Supply Agency, Alexandria, Va. 22314.

Contents of this magazine may be freely reprinted. Mention of the source will be appreciated.

IN THIS ISSUE

FEATURES

1 DOD Administration of Export Controls
Norman E. Eliasson

5 Protecting Classified Information in International Exchanges
Herbert Lewis

8 Army Tank-Automotive Command
Major General Shelton E. Lollis, USA

23 Army Will Test Industry Developed STANO Items
Lieutenant Colonel Victor H. Bray, USA

DEPARTMENTS

12 Bibliography

13 Prime Contract Awards by State

From the Speakers Rostrum

17 Interdependence

19 U.S. Army Navigational Requirements

26 Defense Procurement

In the furtherance of an alliance, military information is sometimes disclosed to foreign governments or international organizations. Transfer of classified information should be regarded as prompted by expected and frequently realized mutual benefit. Articles beginning on pages 1 and 5 discuss this subject.

DOD Administration of Export Controls

Norman E. Eliasson

Who in DOD reviews your application to the Department of Commerce to export a computer?

Who gives the DOD position on whether to approve your application to the Office of Munitions Control to export a Munitions List item?

Who processes an exception to National Disclosure Policy, which is necessary before a classified brochure can be released to your potential customer, the government of X, Y or Z?

Within DOD the focal point for all of the foregoing actions is in the Office of the Assistant Secretary of Defense (International Security Affairs) [OASD(ISA)]. The particular office which handles your problem is the Stategic Trade and Disclosure Directorate, which is directly subordinate to the Principal Deputy Assistant Secretary of Defense (ISA).

The Director, Strategic Trade and Disclosure, in turn, has three small staffs. One is for Trade Control, another for Munitions Control and the third, the Foreign Disclosure Staff. The tasks performed by these three staffs are prescribed by a variety of statutes, executive orders and DOD directives, and can best be understood if the three functional divisions are examined individually.

Trade Control

DOD's role in U.S. and international strategic trade control derives from the Export Administration Act of 1969 and the Mutual Defense Assistance Control Act of 1951, the so-called Battle Act. Preceding the 1969 act was the Export Control Act of 1949. Both of these pieces of legislation stated that "it is the policy of the United States to use export controls to the extent necessary to exercise the necessary vigilance over exports from the standpoint of their significance to the national security of the United States." However, the 1969 act also declares U.S. policy to be "to encourage trade with all countries with which we have diplomatic or trading relations."

Meanwhile, one purpose of the Battle Act is "to provide for the control by the United States and cooperating foreign nations of exports to any nation or combination of nations threatening the security of the United States."

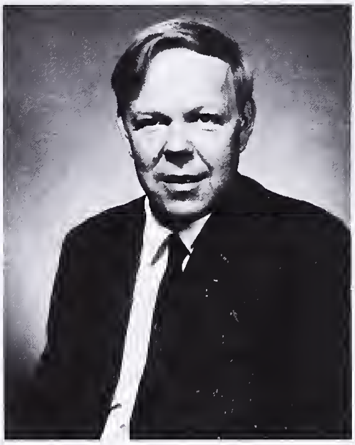
The Department of Commerce executes the Export Administration Act, while the Department of State is charged with executing the Battle Act.

It is clear that DOD, while chiefly concerned with safeguarding the national security when exercising its export control responsibilities, must do so in consonance with the national policy to encourage international trade. Further, the legislation authorizes controls over exports for three purposes—"national security," "foreign policy," and "short supply." Hence, national security controls, and short supply controls, when they are needed, must also reflect U.S. foreign policy and international responsibilities.

Commodities subject to export controls under the provisions of the Export Administration Act of 1969 are found on the Commodity Control List issued by the Department of Commerce. The purpose of the list is to keep American exporters current on what commodities require export licenses before shipment can be made abroad.

It should be noted that Canada represents somewhat of an exception. Export licenses are not required for commodities exported for internal consumption in Canada, except for commodities and technical data related to nuclear weapons, nuclear explosive devices, nuclear testing or nuclear propulsion plants, and copper scrap and alloy ingots.

The Commodity Control List shows the three major categories of country controls which are applied. Category I commodities require a validated license for export to all countries of the world (except Canada as noted before). Category II commodities require a validated license for export to



Norman E. Eliasson is Director, Foreign Disclosure Staff, Strategic Trade and Disclosure Directorate, Office of the Assistant Secretary of Defense (International Security Affairs). He is also Executive Director, National Disclosure Policy Committee. Previously he served on intelligence staffs with the U.S. Army. He is a graduate of Columbia College and Columbia School of International Affairs.

all countries outside the Western Hemisphere but including Cuba. Category III commodities require a validated license for export only to Cuba, communist areas of Eastern Europe (except Yugoslavia) and Asia, Rhodesia, and in some instances Hong Kong, Macao, Poland, Romania and the Republic of South Africa.

Export license applications for commodities on the Commodity Control List are reviewed by the interagency Operating Committee (OC) of the Advisory Committee on Export Policy (ACEP), both chaired by the Department of Commerce. DOD is represented on the OC by members of the OASD(ISA) Trade Control staff, and on the ACEP by the Assistant Secretary of Defense (ISA). His Principal Deputy and the Director, Strategic Trade and Disclosure, are alternate members.

The transfer of Commodity Control List items to third countries by subsidiaries of U.S. firms abroad is controlled by the U.S. Treasury Department with the concurrence of other interested agencies, including DOD. Changes in the Commodity Control List itself also are subject to DOD concurrence.

The provisions of the Battle Act are carried out chiefly through the international Coordinating Committee, better known simply as COCOM. Its members are delegates from the United States and 14 allied countries (Belgium, Canada, Denmark, Federal Republic of Germany, France, Greece, Italy, Japan, Luxembourg, Norway, Portugal, The Netherlands, Turkey and the United Kingdom). COCOM has internationally agreed lists of strategic items somewhat comparable to the U.S. Commodity Control List, and member countries control the export of these items. Requests from member countries to export items on the international lists are reviewed by COCOM. U.S. review of these cases submitted to COCOM takes place within the interagency Working Group I (International Export Control System) of the Economic Defense Advisory Committee (EDAC) which operates under State Department chairmanship. Here again DOD is represented through members of the OASD(ISA) Trade Control staff.

The OASD(ISA) Trade Control staff also contributes the DOD member to U.S. teams which participate in the COCOM embargo list review and which negotiate agreements with other COCOM member countries.

The staff also represents DOD on Working Group II (Application and Enforcement) of EDAC. This group maintains the effectiveness of U.S. and COCOM embargoes through the establishment of control systems, investigative efforts, and the imposition of such penalties as can be applied in the case of violations. Working Group II also studies the problems of transit trade and enforcement involving third countries, and assembles and reviews intelligence and other relevant information on questionable East-West and other trade activities.

The foregoing OASD(ISA) Trade Control staff activities are governed by Executive Order 10945, "Administration of the Export Control Act," as amended; DOD Directive 2030.4, "DOD Support for the Strategic Trade Control Program"; and DOD Directives 2030.2, 2030.3 and 2030.5, which deal with security trade controls on foreign excess personal property and foreign nonexcess personal property sold by DOD.

Munitions Control

The Mutual Security Act of 1954, as amended, authorizes the President "to control, in furtherance of world peace and the security and foreign policy of the United States, the export and import of arms, ammunition and implements of war, including technical data relating thereto, other than by a United States Government Agency."

The President is further authorized "to designate those articles which shall be considered as arms, ammunition and implements of war, including technical data relating thereto. . . ."

Executive Order 10973 delegates to the Secretary of State all functions conferred upon the President by the Mutual Security Act. The order further decrees that in carrying out these functions the Secretary of State shall consult with appropriate agencies. However, the order specifies that "Designations, including changes in designations, by the Secretary [of State] of articles which shall be considered as arms, ammunition and implements of war, including technical data relating thereto . . . shall have the concurrence of the Secretary of Defense."

The designations in which the Secretary of Defense concurs are those appearing in the International Traffic in Arms Regulations (ITAR) which are Parts 121 through 128 of Title 22—Foreign Relations, Code of Federal Regulations. Section 121.01 of the ITAR is the U.S. munitions list.

Proposed revisions of the ITAR may originate within DOD as well as in the Department of State. In accordance with Executive Order 10973, the OASD(ISA) Munitions Control staff coordinates the DOD position on such proposed revisions. However, the greater part of the Munitions Control staff effort is spent reviewing and recommending decisions on individual Munitions Control license request cases.

In order to expedite the review of Munitions Control cases, the Office of Munitions Control in the Department of State distributes copies of export license applications, with background data when it is required, to appropriate DOD staff elements in the Office of Defense Research and Engineering, the military departments, the Office of the Assistant Secretary of Defense (Installations and Logistics) and other organizations, such as the Joint Chiefs of Staff, if the proposed export so requires. The OASD(ISA) Munitions Control staff manages this review of munitions control cases, providing current politico-military and security guidance to the technical reviewers in the staff elements. The OASD(ISA) Munitions Control staff ultimately prepares and provides to the Office of Munitions Control the DOD-recommended decisions on the cases. These recommendations are based on security, technical and politico-military implications of each case.

Beside the foregoing activity within government channels, the Munitions Control staff maintains close and continuing contact with industry. One purpose of this contact is to save industry wasted effort in filing applications that cannot be approved. Sometimes the reasons are not readily apparent.

In the DOD review of export license applications, all cases are examined carefully against the criteria set forth in the National Disclosure Policy (which will be discussed later) to ensure that the approval of unclassified munitions cases will not inadvertently commit the United States to future release of classified information or material. The export of unclassified information or material related to classified items requires the approval of the cognizant department or agency if release of such related classified items may later be required. The cognizant DOD component brings the situation to the attention of OASD (ISA) and either certifies that the classified item is within the limits of the National Disclosure Policy and that the eventual disclosure of classified information meets the criteria of that policy, or that the eventual disclosure will exceed the limits of that policy. In the latter instance, the cognizant component must state whether or not it is willing to sponsor a request for an exception to the National Disclosure Policy to permit the eventual disclosure.

These procedures are spelled out in DOD Directive 5030.28, "Munitions Control Procedures for U.S. Munitions List Export License Applications Referred to DOD by Department of State."

Foreign Disclosure

A familiar cautionary notice often appears in classified documents. It generally reads as follows: "This material contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, USC, Sections 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law."

For obvious reasons, such as in furtherance of an alliance, classified military information must sometimes be disclosed to foreign governments or international organizations. When this is done, it is governed by the general policy statement contained in the National Disclosure policy (NDP–1) which states: "It is the policy of the U.S. Government to treat classified military information as a national security asset which must be conserved and protected, and which may be shared with foreign entities only where there is a clearly defined advantage to the United States." Our purpose here is to explain how this is done.

In 1934 the Secretary of State suggested to the War and Navy Departments that there be consultation on the shipment of goods affecting the military security of the United States. During World War II the arrangements for the consultations became centered in the Technical Information Security Control Committee which was a subcommittee of the State, War and Navy Coordinating Committee.

It was not until 1946, however, that the President decreed there be formal arrangements for controlling the disclosure of classified military information. This action was embodied in the Presidential Directive of Feb. 27, 1946, titled, "Basic Policy Governing the Disclosure of Classified Military Information to Foreign Governments," and was reaffirmed in a second Presidential Directive on the same subject dated Sept. 23, 1958.

These Presidential Directives, together with NSC Action 2125 of Sept. 10, 1959, are the basis and forerunners of the current National Disclosure Policy (NDP–1).

The organizations which administered the policy in earlier years were the State-Defense Military Information Control Committee from 1949 to 1964 and then, until 1966, the U.S. Military Information Control Committee. Since 1966, the central authority for formulating, promulgating, administering and monitoring the National Disclosure Policy has been the National Military Information Disclosure Policy Committee (NDPC).

The current National Disclosure Policy was issued on Dec. 17, 1969, by the Secretary of Defense, with the approval of the Secretary of State and the concurrence of the Chairman of the Atomic Energy Commission and the Director of Central Intelligence. It went into effect Jan. 1, 1970. Hitherto, the chairmanship and executive direction of the NDPC had been functions of the Department of State.

With the new policy these functions were shifted to DOD. The Director, Strategic Trade and Disclosure in ISA became the Chairman, NDPC, as well as the OSD member of the committee. The Foreign Disclosure staff in OASD(ISA) serves as a secretariat for the NDPC and its director is the Executive Director of the NDPC.

The members of the NDPC are representatives of the Secretaries of State, Defense, Army, Navy and Air Force; the Joint Chiefs of Staff; the Chairman, Atomic Energy Commission; the Director of Central Intelligence; the Director of Defense Research and Engineering; the Assistant Secretary of Defense (Administration); the Assistant to the Secretary of Defense (Atomic Energy); and of the Director, Defense Intelligence Agency.

The new National Disclosure Policy has an important effect upon the exporter of classified information. While the primary purpose of the policy is to control release by the U.S. Government of U.S. classified information to foreign governments and international organizations, it also impinges upon the ability of a manufacturer to export his classified goods through export control channels, as was outlined earlier in discussing munitions control.

For purposes of definition, classified military information is information under the control or jurisdiction of the Defense Department, its departments or agencies, or of primary interest to them, which requires protection in the interests of national defense. Its classifications are Top Secret, Secret and Confidential. Classified military information may be embodied in equipment, or may be in written, oral, or other form.

Many exporters of classified military information may never have heard of NDP–1 or the NDPC, and some exporters may be unaware that approvals or denials of classified proposals have been the subject of NDPC consideration.

One may ask why no publicity is given to NDP–1 when it is, in effect, a set of national standards. These standards have not been published in the Federal Register since, primarily due to the fact that they vary by country, they are themselves classified. Accordingly, they are applied on a case-by-case basis determined by the security and foreign policy considerations inherent in each export proposal at the time of its submission.

Each proposed release of classified

military information through Munitions Control channels is examined in the light of the policy. If a manufacturer's proposal meets the criteria set forth in NDP–1, or a specific exception to it has been granted, the case is generally approved. Disapproval could mean one of three things:

- The proposed disclosure is in a prohibited area or otherwise fails to meet NDP–1 criteria.
- The request failed to meet policy standards, and no federal government agency wanted to sponsor an exception which would have allowed the release.
- The government sponsor failed to convince the members of the NDPC that an exception was in the best interests of the United States.

Underlying NDPC judgments in each case is the stated goal to strike a proper balance between the attainment of U.S. objectives on the one hand and the preservation of the security of our military secrets on the other.

A logical question is: How can an export application be prepared in such a way as to conform to a policy to which the applicant does not have access? The following suggestions may be helpful.

From the foregoing it should be clear that the U.S. Government must avoid giving a false impression of its readiness to make available classified military material, technology, or information to foreign entities. Hence, if an exporter is proposing discussions with such foreign entities of programs which might involve the eventual disclosure of classified military information, it must be explicity understood and acknowledged that no U.S. commitment to furnish such classified information or material is intended or implied. In addition, it is in the exporter's best interest to identify completely all classified components of his export proposal as early as possible, so that the required exceptions to policy or other special processing can be completed before he initiates a foreign sales effort.

Needless to say, the latter will require early coordination between the contractor and the cognizant DOD component controlling the classified information or material. If the foregoing is kept in mind, detailed knowledge of the National Disclosure Policy is not essential for the exporter of classified items. It should suffice to know that there is a general policy which influences classified exports and provides for exceptions to that policy.

This is in essence the control activity which is commonly referred to as "Foreign Disclosure," governed by DOD Directive 5230.11, "Disclosure of Classified Military Information to Foreign Governments and International Organizations."

Mutual Understanding Needed

The most frequent complaint heard from industry concerning trade and munitions controls centers on the time that it takes to consider export applications. While DOD does not control the issuance of export licenses, the OASD(ISA) Trade Control, Munitions Control and Foreign Disclosure staffs have listened carefully to these complaints. They have sought systematically to reduce DOD processing time through organizational streamlining and the elimination of clerical delays. The Foreign Disclosure staff has developed an automated data processing system which also could be used by the Trade Control and Munitions Control staffs should the need arise. However, it is possible that we are close to an irreducible minimum in correcting staffing delays. It is axiomatic that the clear-cut case is easier to decide than the complicated one which may lack precedents or hover near the extreme limits of policy and, perhaps, contain unacceptable risks to the national security.

Working together, industry and the Government can avoid these risks to the national security, while pursuing the Export Administration Act goals "to encourage trade with all countries with which we have diplomatic or trading relations." The problems involved in achieving a proper balance between security considerations and increased international trade may not be simple, but they are far from insuperable.

Mutual understanding between industry and Government on the needs and purposes of trade controls is the key to achieving the maximum benefit to the nation from the exports of its defense industry.

Improved Instrument Lights Flight Tested

An electroluminescently lighted instrument panel is being flight tested by the Air Force Systems Command's Aeronautical Systems Division. Purpose of the tests is to determine the best possible cockpit lighting for an aircraft pilot.

Basically, an electroluminescent lamp is a layer of light-emitting phosphor sandwiched between two electrodes. Proper voltage across the electrodes causes light to be emitted from the phosphor. The light remains constant from dim to bright, and color does not change as the brightness is varied.

Aircraft lighting has seldom been adequate for night missions requiring the pilot to devote attention to the night environment outside the cockpit. Pilots say that, for instance, to see their instruments they must set cockpit lights too high for night vision. Also, the regular panel lights can cause the canopy to glow, making an otherwise blacked out plane visible in a combat situation. Uneven panel lighting makes it difficult to read the instruments.

The panel being tested employs three techniques of instrument display illumination. Light-reflecting displays use electroluminescent lamps mounted on a light wedge to distribute light uniformly over the instrument surface, where it is reflected to make the instrument display visible. Light-transmitting displays use controlled light transmission through plastic panels to illuminate each legend or scale to the required amount. Finally, light-emitting displays use light as the display element and must develop the contrast that makes it visible.

With the panel, light for each instrument can be controlled individually so that the pilot has the best possible light across the instrument panel.

Project engineer for the test program is Lieutenant David Turney of the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio.

Protecting Classified Information in International Exchanges

Herbert Lewis

Classified information is by nature most intimately related to our national defense. Just as U.S. defense interests extend beyond our national boundaries, so must the use of the U.S. classified information which furthers those interests.

Those countries or treaty organizations which have a mutual defense interest with the United States are given sufficient classified information to enable them to carry out their responsibilities. This release of classified information is by no means one-sided. Other countries and treaty organizations share their classified information with the United States to further their own defense efforts. Transfer of classified information should be regarded as exchange prompted by an expected and frequently realized mutual benefit.

The classified information, both U.S. and foreign, involved in such exchanges requires appropriate protection. Since the exchanges involve defense information, the Secretary of Defense has the primary security responsibility. This function is carried out through the Assistant Secretary of Defense (Administration) and the Deputy Assistant Secretary of Defense for Security Policy. It is their responsibility to provide guidelines for protection of foreign classified information entrusted to the United States, and to provide every reasonable assurance that U.S. classified defense information entrusted to foreign countries will be properly protected.

At this point, it might be well to delineate a bit more sharply the function of the Office of the Deputy Assistant Secretary for Security Policy in the exchange program. It does not determine the nature of the classified information which is to be given or accepted. This is the function of other staff elements of DOD. But it enters into the transaction to ensure that the classified information involved receives proper protection.

As might be expected, protective measures for international exchanges are based upon various forms of international security agreements between the United States and foreign governments or international organizations. They are of two basic types of agreements—bilateral, between the United States and a particular country; and multilateral, between the United States and a group of allied countries such as the North Atlantic Treaty Organization, the South East Asia Treaty Organization, and the Central Treaty Organization.

Bilateral Agreements

Since the end of World War II, bilateral agreements have been negotiated with a number of foreign governments. These agreements vary in format and detail, depending on the nature and scope of the contemplated exchange of classified information.

The most frequently used bilateral format is called, in security parlance, a general agreement. Such agreements are negotiated between the State Department and the foreign ministry of the other country. These agreements are fairly standard. They contain a recital of the mutual defense interest and an understanding of the responsibility of each government as a recipient of classified information. They agree to:

- Afford the information substantially the same degree of protection afforded it by the releasing government.
- Not use the information for a purpose other than that for which it was released.
- Not release the information to a third government without the approval of the releasing government.
- Respect private rights, such as patents, copyrights, or trade secrets, involved in the information.

General agreements, as their name implies, do not contemplate the exchange of any specific type or quantity of classified information. They are meant to provide the security assurances for an exchange when the governments decide to do so. For the most part, they do not specifically envision an exchange of classified military technology.

Herbert Lewis is Chief, International Branch, Security Plans and Programs Division, Office of the Deputy Assistant Secretary of Defense (Security Policy). Previously he was staff director, Industrial Personnel Security Review Division. He has spent most of his 29 years of Federal service in the security field. He holds a bachelor of science from Yale University.

When the United States and a foreign government contemplate a relatively extensive exchange of classified military technology for use by industry, the general agreement is amplified by a separate industrial security agreement. These agreements are drafted by the Office of the Deputy Assistant Secretary of Defense for Security Policy which also participates in their negotiation. These agreements are concluded between the Secretary of Defense and the defense ministry of the foreign government. It should be emphasized that they are meant to augment general agreements and are only used where general agreements already exist.

Industrial security agreements cover in some detail the principal security measures applicable in protecting information incidental to classified work undertaken in industry in either country. These include provisions for clearance of facilities and individuals by each country, handling and transmission of classified information, and procedures for visits involving the exchange of classified information. The provisions of industrial security agreements are in consonance with the procedures of the Industrial Security Manual for Safeguarding Classified Information and the DOD Industrial Security Regulations.

There are at present industrial security agreements with Australia, Canada, the Federal Republic of Germany, the Netherlands, Sweden, Switzerland, and the United Kingdom.

In some instances, because of legal or security considerations, the State Department is unable to negotiate a satisfactory general security agreement with a foreign government, but the defense ministry of that government is able to offer satisfactory guarantees that U.S. classified information transferred to it will be adequately protected. In such a case, a special security agreement is negotiated between the U.S. Defense Department and the defense ministry of the foreign government. In practice, these agreements are limited in scope and usually involve information of relatively low degree of sensitivity relating to defense material which has been sold to that country in furtherance of U.S. defense interests.

Each special agreement is tailored to meet the particular security conditions of the foreign government and, at the same time, to satisfy U.S. security requirements. In contrast, general security agreements, and industrial security agreements which supplement them, are drawn on the assumption that the foreign government operates a security system which, though differing in detail, is roughly parallel to that of the United States.

As in the case of industrial security agreements, special agreements are drafted for DOD by the Office of the Deputy Assistant Secretary of Defense for Security Policy, which also participates in their negotiation. Usually, the request for the agreement comes from a DOD staff element which has determined that the release of certain classified information to the foreign government would be in the best interests of the United States.

It should be noted that, prior to or during the negotiations of the bilateral agreements, the United States conducts a survey of the security procedures of the foreign government involved to determine whether it has the capability of safeguarding U.S. classified information. If serious deficiencies are noted, the foreign government is informed of the corrective action required. Almost invariably foreign governments have been cooperative in taking necessary remedial action.

If the exchange of information extends over a long period, each country may send inspection teams to the other to ensure compliance with the terms of the agreement. The frequency and extent of these inspections is dependent on the amount and sensitivity of the information exchanged.

Foreign classified information released to the United States under bilateral agreements is protected by Executive Order 10501. Each department or agency in the Executive Branch which receives such information makes provisions for appropriate protection. Within the Defense Department, DOD Directive 5200.1 provides that such information will be afforded the same protection as is afforded to U.S. information of equivalent level. For example, Confidential information received from the United Kingdom is protected in the same manner as U.S. Confidential.

There are no fixed exchange channels for classified information transferred under bilateral agreements. The channels are usually determined by the nature and extent of the exchange involved, but the actual exchanges occur where there is an appropriate interface of the defense staffs of the two governments. One rule, however, governs all exchanges of classified information. The exchange may take place on a government-to-government basis only. No industrial facility or employee of a facility in one country may receive classified information directly from another country.

There are no additional clearance requirements for access by U.S. personnel to such foreign classified information. A U.S. employee holding a clearance for U.S. Confidential is eligible, provided he has a need to know, for access to foreign Confidential information exchanged through a bilateral agreement.

There is no requirement from a security standpoint that foreign classified information be handled and stored separately from U.S. classified information. Both types of information may be merged into a single file if desired for convenience or ready reference.

Bilateral agreements provide the protective framework for the sale by the United States of classified military equipment. They also make it possible for foreign governments to purchase classified material from U.S. contractors. Finally, and perhaps most importantly, they enable U.S. and foreign contractors to combine their classified technology in the interests of the national defense of the countries involved.

Multilateral Agreements

Multilateral agreements are concerned with protecting information contributed by the United States and other nations as participants of the North Atlantic Treaty Organization (NATO), the Southeast Asia Treaty Organization (SEATO), and the Central Treaty Organization (CENTO). Although not a member of the Central Treaty Organization, the United States does participate in many of its activities.

All of these organizations were created because of recognized need for a common defense effort on the part of the participating nations. A common defense effort implies a sharing by the participants of classified defense information. Each of these treaty organizations contain specific provisions for the protection of classified information placed in the organization.

The instructions of each of these three treaty organizations require that each member nation designate a National Security Authority who will be responsible for the security of all classified information of the treaty organization within each respective national jurisdiction.

In the United States, the Secretary of Defense has been designated as the National Security Authority for NATO, SEATO, and CENTO affairs. This authority, except for a few particulars, has been delegated to the Deputy Assistant Secretary of Defense for Security Policy.

The U.S. National Security Authority has responsibility for the security of all treaty organization classified information within the United States. He is required to promulgate security instructions to implement the security instructions of each treaty organization. These instructions for safeguarding classified information are effective throughout the Executive Branch of the U.S. Government. The instructions are drafted by the Office of the Deputy Assistant Secretary of Defense for Security Policy. Implementing procedures for each of the three treaty organizations are signed by the Secretary or the Deputy Secretary of Defense.

The Deputy Assistant Secretary of Defense for Security Policy, acting for the National Security Authority, is responsible for coordinating and presenting the U.S. position on measures affecting the protection of classified information within each of the treaty organizations. He must, as far as possible, ensure that the international organization has stringent rules to protect U.S. classified information and that of other participating nations, without impeding the flow of such information to its intended recipients.

Each treaty organization has a registry system for the transmission of its own classified information. The systems are designed to provide accountability for sensitive information and to restrict access to properly cleared persons. Each participating nation and major element of the three treaty organizations must maintain a NATO, SEATO, and CENTO Central Registry and a network of similar transmission units called subregistries and control points. Except for material sent to U.S. contractors, all NATO, SEATO, and CENTO classified information is transmitted through the registry channels.

In the United States, the focal point for treaty organization registry systems is the Central United States Registry (CUSR), operated by the Office of the Adjutant General, Department of the Army, as executive agent for the U.S. National Security Authority for NATO, SEATO and CENTO. The Deputy Assistant Secretary of Defense for Security Policy has the responsibility for staff supervision and inspection of the CUSR.

Although it is a single agency, the CUSR maintains the NATO, SEATO and CENTO organizational registries as separate entries. The CUSR establishes subregistries and control points as needed by the various departments and agencies of the Executive Branch. It should be emphasized that, while the CUSR establishes subregistries and control points, the operation and control of the latter is the responsibility of the departments and agencies in which they are established. The CUSR does, however, conduct an annual inspection of most U.S. subregistries worldwide to ensure compliance with the instructions of the U.S. Security Authority. Excepted are the subregistries in U.S. embassies outside the United States, which are inspected by the Department of State.

One aspect of U.S. relationship with NATO deserves special mention. The United States releases a limited amount of Restricted Data and Formerly Restricted Data to NATO. This information is subject to even stricter control than other classified information of the same classification level. NATO has a separate registry system for its receipts and transmissions, and each registry, subregistry and control point in the system must maintain access lists of persons authorized to receive this information. In addition, the Defense Department and the Atomic Energy Commission conduct inspections of NATO elements and NATO member nations holding such information.

The contrast between the security procedures in the multilateral agreements and those in the bilateral is rather striking, although in practice the protection afforded to the information exchanged differs very little.

Multilateral exchanges in the treaty organizations require special channels of transmission, special clearances for access, and periodic inspections. In a bilateral exchange, each country agrees to protect the others' classified information in substantially the same fashion as its own.

In bilateral exchanges, each recipient incorporates the foreign information received into its own classified holdings. In multilateral exchanges with treaty organizations, the pooled information is maintained separately and protected in accordance with the security instructions of the treaty organization. It must be remembered that the international treaty organizations have no classified information of their own. They are dependent on a common fund of classified information. In order to induce the participating nations to release their classified expertise, there must be provided a rather formally structured system giving reasonable assurance of protection.

The practice of exchanging classified information with other governments needs no justification. In general, it has served to improve the defense posture both of the United States and those nations with whom the information has been shared. It has avoided duplication of research and production costs by disclosing to participating nations either the existence of desired defense materials or the technology to produce them. While it has not removed the barriers that surround both the secrets of the United States and those of its allies, it has established carefully controlled conduits through which selected elements of classified information may flow from one government to another in the interests of mutual defense.

The ability of the United States to exchange classified information is based on its ability to protect the classified information received and to assure the protection of information released.

Army Tank-Automotive Command

Development and Acquisition of Tactical and Combat Vehicles

Major General Shelton E. Lollis, USA

A shared responsibility, in every sense of the expression, describes the relationship of the U.S. Army Tank-Automotive Command (TACOM) with both large and small industry.

TACOM, a subordinate command of the Army Materiel Command (AMC), is housed at the Detroit Arsenal, in Warren, Mich., a suburb 17 miles northeast of Detroit.

The mission involves research, engineering, development, procurement, repair parts supply, operational training and maintenance support, associated with the wheeled and tracked tactical and combat vehicles used by all the military services.

TACOM is the Army's worldwide manager of tactical vehicles and selected combat vehicles, and the repair parts peculiar to those vehicles. This worldwide inventory, valued at $3.5 billion, includes about 50,000 different automotive parts for a fleet of 535,000 tactical vehicles.

In addition, TACOM supports other AMC commands, military services, and foreign military assistance and sales programs which involves about 500,000 vehicles. The magnitude of the TACOM mission is both imposing and challenging. Obviously, it is a mission that leans heavily on the unyielding support of private enterprise.

As an oversimplification of the case, it can be said that TACOM establishes production requirements and production standards. Private manufacturers address their production know-how to the problem of fulfilling those requirements.

TACOM has 10 directorates and several operational offices within the command organization structure. Each of these elements contributes to the total product. Some of them deal only with internal activities, while others are concerned with such exclusively Army matters as the ordering and moving of supplies.

To develop a complete and accurate picture of how the TACOM-industry interplay collectively keeps the supply line filled with top quality material, let's examine more closely those operating elements that are associated with industry in their day-to-day efforts.

Laboratories

It all begins in the laboratories. Research, test, and evaluation programs in advanced vehicles, mobility and propulsion systems, components and materials, and physical sciences related to tank-automotive materiel are planned and performed by the laboratories, or appraised by the laboratories in the case of contracted programs.

Five TACOM laboratories—Advanced Systems, Mobility Systems, Propulsion Systems, Vehicular Components, and Materials and Physical Science—support the command's current development and production programs in mobility and propulsion systems and in components and materials applications.

The Advanced Systems Laboratory develops and prepares long range vehicle systems concepts based on logistical and tactical patterns for the anticipated character of the Army's future needs.

Translating the soil mechanics effort in ground strength and terrain-vehicle interactions into vehicle design is one of many jobs performed by the Mobility Systems Laboratory. Other functions include performing vibration research, making analytical predictions of vehicle performance, and defining vehicle ride dynamics.

TACOM's Propulsion Systems Laboratory is the principal engine-power train organization in the Army. Operating extensive test and experimental facilities, the laboratory uses automatic computerized instrumentation and control equipment in performing field simulation tests. Its staff pursues comprehensive programs on fuels, combustion research, filters, and lubricants engineering studies.

Supporting extensive programs in

Major General Shelton E. Lollis, USA, has been Commanding General, Army Tank-Automotive Command, Warren, Mich., since October 1967. Prior to this he served as deputy and then commanding general, First Logistical Command, Vietnam. General Lollis holds a bachelor's degree in electrical engineering from the University of Oklahoma.

materials behavior in stress and extreme environments is the primary responsibility of the Vehicular Components and Materials Laboratory. In this facility, physical, chemical, mechanical, electrical, radiographic, and metallurgical investigations are performed in connection with all engineering programs. The laboratory assists in solving manufacturing and processing problems for vehicle components.

Long range scientific problems that relate to the other laboratories is the full time objective of the scientists assigned to the Physical Science Laboratory. The main inhouse program of this group is the identification and control of the entire range of vehicle signatures, including infrared, sonic, seismic, and magnetic.

TACOM's laboratory complex works closely with the Development and Engineering Directorate to fit power trains and basic component subsystems into vehicles on predetermined time cycles that conform to end item commitment dates. The laboratories, in their effort, are guided by the constraints of stringent military requirements for top quality vehicles of varying power ranges and weight classes that will operate effectively in all field environments.

The scientific-engineering challenge at TACOM is supported by industry with contracts for hardware and services. But the increasing number and complexity of problems associated with providing and maintaining today's vehicle fleet are placing expanded demands on the Army-industry team. Current cost figures indicate that the ratio of operating costs to acquisition costs is approximately three to one.

To achieve a proper balance between cost factor and adequate defense posture, the most effective management techniques are employed in determining how many research and development dollars will be allocated to acquisition or long range research and development objectives, and how many will be devoted to current or operational research and development efforts.

Development and Engineering

The Development and Engineering Directorate provides engineering services from "cradle to the grave." Once the user requirements are known and begin to harden through the process of the qualitative materiel requirement, the primary involvement of this directorate begins.

This TACOM organizational element is responsible for the direction of development and engineering through concept, engineering development, advanced production engineering, and support to production and out-of-production systems. In support of that broad mission, we may fabricate inhouse concepts or pilot systems. We support international programs, including data exchange agreements and co-production. Also, inherent in the mission of the Directorate of Development and Engineering is the planning and direction of safety, reliability and value engineering efforts which are integral to the overall engineering of vehicle systems. The directorate also has responsibility for direction of engineering development of diagnostic systems used in support of internal combustion engine equipment.

To support the Director of Procurement and Production, the Development and Engineering Directorate provides technical data packages for procurement of both major and secondary items. This package includes transportability engineering requirements and packaging data. Engineering change orders are developed and released to correct "no fit" conditions or drawings and specifications that are found to be in error as a result of production experience. Rebuild specification and wear limits are established in support of depot rebuild, and field maintenance programs are provided to the Maintenance Director for his inclusion into maintenance and rebuild technical publications.

Engineering investigations and evaluations are conducted on equipment improvement reports from the field. In the event a modification requiring engineering support is necessary, the Development and Engineering Directorate provides assistance. It participates in trial installations and monitors test results prior to the release of a Department of the Army modification work order.

Unsolicited proposals received from industry are reviewed and evaluated to determine their merit and value in the military environment.

Using a portable crane, model makers of the TACOM Development and Engineering Directorate assemble mock-up by fitting cupola into the hull.

Invitations for bids are prepared in conjunction with the Procurement and Production Directorate relative to advance production engineering. Production engineering contracts are awarded and renewed on an "as required" basis to provide industry support to military ground mobility equipment.

Maintenance

The Maintenance Directorate serves as TACOM's national maintenance point and plans, directs and manages the National Maintenance Engineering Program for tank-automotive equipment from concept through obsolescence. Among responsibilities of the Maintenance Directorate are determination of maintainability and development of maintenance support plans for all newly designed material.

The national maintenance point effort covers two basic functional areas: maintenance engineering programs which influence vehicle design, and field maintenance policy. This includes solving user problems, provisioning for vehicle fleets and other software associated with fielding a piece of equipment.

Maintenance technicians work directly with production engineering contractors to establish a final list of repair parts to support new vehicles. Through review of drawings, repair parts, and vehicles, they determine the interchangeability and standardization of parts, recommending to the contractor various modifications to parts already in the supply system that can do the same job without adding a new part to the system.

In addition, the Maintenance Directorate oversees preparation, development, and dissemination of all source data for Department of the Army equipment publications in the tank-automotive field. Ninety percent of the manuscripts are prepared by production engineering contractors developing the vehicles since they have the necessary data (drawings, parts and vehicles) readily available. Guidance is furnished to the contractors in preparing manuscripts, both technically and editorially. All manuscripts are reviewed for accuracy by the Maintenance Directorate at several points.

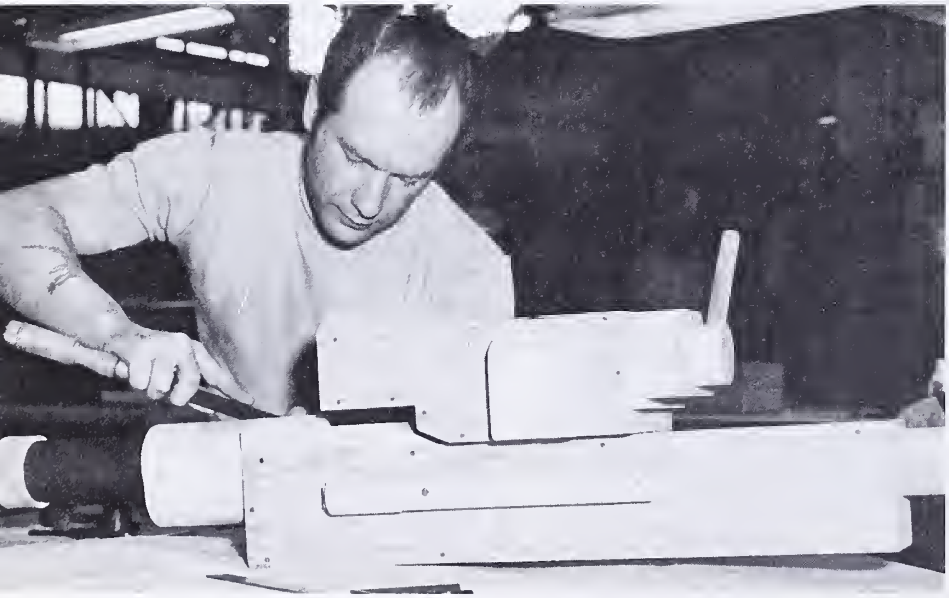
Introduction of newly developed equipment necessitates instruction of key military and civilian personnel in its maintenance and operation. This is accomplished by a Liaison and Training Division shortly after manufacture of early pilot models. Personnel completing the initial course of instruction return to their organizations and formulate courses of instruction to be taught in the military service schools. The program is scheduled so that graduation of the first class from the service schools is concurrent with delivery of the equipment to the user.

Technical assistance to all U.S. military forces and Military Assistance Program countries is provided on an "as required" basis by TACOM maintenance technicians stationed throughout the world.

A great amount of the functional effort of the maintenance mission is through contracts with industry. Industry performs a diversity of tasks from key punching cards to rebuilding tanks and trucks.

To maintain peak efficiency in performing its mission the TACOM Maintenance Directorate relies on the support of industry and major attention is directed to improving lines of communication with industry to eliminate any element of doubt that the support exists and is productive.

A model pattern maker works on mockup of a 20mm gun, a function of the TACOM Development and Engineering Directorate.



Procurement and Production

Located at the Michigan Army Missile Plant, five miles from the TACOM headquarters complex, the Procurement and Production Directorate is the national procurement point for the commodities managed by the command.

The directorate is responsible for an annual procurement program of close to $1 billion.

A steady stream of qualitative information pours into the procurement machinery—requests for inclusion on the TACOM bidders' list, responses to solicitations, requests for clarification of solicitations or specifications, value engineering proposals, reports of pre-award surveys, audit reports, etc.

One of the more important sources of information and help is the TACOM small business advisor. Through him, various ways are found of furthering the expressed desire of Congress that small business firms obtain a fair share of DOD procurement dollars.

Quality Assurance

As the name of the organization clearly indicates, the purpose of the Quality Assurance Directorate is to confirm that the quality designed into the product actually exists when it is delivered into the inventory. Every function of the five divisions within the directorate is related directly or indirectly to this objective.

A staff of quality assurance engineers assess vehicles and components throughout their life cycles and in this way establishes reliability and maintainability parameters.

Data relating to tests, performance, field environment, deficiencies, down time, and many other important factors are collected and analyzed. The results are passed along to the other operating directorates to assist them in decision-making processes that deal with cost reduction, product improvement, and increased product reliability and maintainability.

Specific responsibilities of the directorate include inspecting engineering contractors, vehicle acceptance inspection, monitoring vehicle tests, and furnishing technical assistance to contractors or other DOD agencies.

Getting right into their jobs of evaluating components of the M561 vehicle are key inspectors of the TACOM Quality Assurance Directorate.

The quality assurance function has become increasingly important over the years. The government's role has changed from physically inspecting items produced by contractors to a quality assurance function. The current environment requires monitoring and approving contractors' systems to assure appropriate controls for inspection and acceptance of items produced for the Government.

Combat readiness in the name of national defense means troops with the most modern equipment, free of defects and instantly available to do the job for which it was designed.

In the case of TACOM, the equipment involved is tracked and wheeled vehicles and their repair parts. TACOM, in doing its job, can measure its effectiveness in terms of the effectiveness of its working and continuing relationship with its partners, both large and small, in industry.

Weather Reconnaissance System Contracts Awarded

Two $300,000 contracts for definition studies on the Airborne Weather Reconnaissance System (AWRS) have been awarded by the Air Force Systems Command's Electronic Systems Division (ESD), L. G. Hanscom Field, Bedford, Mass. Selected from among six bidders were General Dynamics Electronics Division, San Diego, Calif., and Kaman Corp., Bloomfield, Conn. Upon completion of the definition, a single company will be chosen for the acquisition contract.

Combining both off-the-shelf and newly developed sensors, the system when operational will provide the Air Weather Service of the Air Force with a substantially increased capability to collect, process and relay weather data to selected ground stations on a global basis. The program was recently reoriented to emphasize tropical storm reconnaissance after Hurricane Camille.

AWRS is being acquired by the ESD Aerospace Instrumentation Program Office.

Emergency Flight Control Power Package Tested

An emergency aircraft control hydraulic power package is being flight tested by the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio.

Called a Simplex Integrated Actuator Package, it is part of a survivable flight control system, combining power-by-wire with fly-by-wire.

A high performance aircraft cannot be controlled without hydraulic power. Therefore, a pilot usually must eject from his aircraft when his central hydraulic system fails because of malfunction or battle damage. With the emergency system, a pilot has power for nearly two hours to fly home and land after his central hydraulic system has been knocked out.

The emergency system consists of an electric motor driven hydraulic pump and a hydraulic reservoir. The Simplex system also provides standard flight operating performance while powered by the aircraft's central hydraulic system.

Flight tests conducted in a modified YF-4E Phantom II aircraft have shown that the emergency hydraulic system has performed beyond the original limits set for the required get-home-and-land capability. In a number of simulated inflight central system failures, the system provided power to the stabilator (horizontal tail) within one-half second. System temperature is critical, since hydraulic lines are not cooled by running them through the fuel tanks. During flight tests, however, the temperature remained below 275 degrees Fahrenheit.

Flight endurance of the pump was satisfactory and power was more than adequate. The Simplex System was developed by LTV Electrosystems of Dallas, Tex.

The survivable flight control system is under development by McDonnell Douglas Corp. Purpose of this program is to replace long hydraulic lines and mechanical linkages running through an aircraft with redundant dispersed wires which carry electrical signals from the pilot to the actuator packages.

BIBLIOGRAPHY

GOVERNMENT PRINTING OFFICE PUBLICATIONS

These publications may be purchased at the prices indicated from:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402.

Effect of Value Engineering Changes on Reliability of Equipment in Service. Reports on a study made to determine the impact of Value Engineering (VE) changes on the reliability of in-service equipment. VE definition, VE policies, approval of VE changes, and performance and payment of VE are discussed. Recommendations included. 1970. 74 p. D7.2:V 24/3. 70¢.

DSA Equal Employment Opportunity, Affirmative Action Plan. Constitutes the Equal Employment Opportunity Affirmative Action Plan for the Defense Supply Agency. 1970. 20 p. D7.6/7:1400.2. 30¢.

U.S. Foreign Assistance in the 1970s: A New Approach. Report to the President, covers foreign economic and military assistance programs and provides recommendations and conclusions. By the Task Force on International Development. 1970. 39 p. Pr37.8:In 8/F 76. 30¢.

Improving the Prospects of Small Business. This report by the President's Task Force presents an overview of the problems faced by small business today, considers the problems of the future, and recommends what might be done to enhance small business prospects in this country. 1970. 30 p. Pr37.8:Sm 1/R 29. 25¢.

The Next Decade in Space. A Report by the Space and Technology Panel of the President's Science Advisory Committee. 1970. 63 p. PrEx8.2:Sp 1. 65¢.

Classification System for Indirect Costs of Defense Contractors in the Aircraft Industry. 1970. 134 p. il. D305.2:C 53. $1.25.

Manual for Standard Data Elements, DOD Data Elements Standardization Program. March 1, 1970. 483 p. D1.6/2:D 26. $7.00.

DEFENSE PROCUREMENT CIRCULARS

Distribution of Defense Procurement Circulars is made automatically by the U.S. Government Printing Office to subscribers of the Armed Services Procurement Regulation (ASPR).

Defense Procurement Circular No. 80, June 22, 1970. (1) Memorandum from the Assistant Secretary of Defense (Installations and Logistics). (2) Preparation, Storage, and Intra-Area Movement of Personal Property, ASPR Section VII, Part 16. (3) Automatic Data Processing Equipment (ADPE) Leasing Policies and Practices of Defense Contractors. (4) Requirement for Reidentification of Contracts Not Identified in Accordance with ASPR Section XX. (5) Revision of ASPR Section XXI—Effective for FY 1971. (6) Reporting and Controlling Industrial Plant Equipment.

Defense Procurement Circular No. 81, August 21, 1970. (1) Instructional Material and Clauses for Inclusion in Contracts to be Performed in RVN. (2) Provision to be Included in Solicitations for Fixed Price Contracts to be performed in Vietnam. (3) Special Notice to Purchasing Offices Executing Contracts for Performance in Vietnam. (4) Bid Opening Time. (5) Procurement Involving Work to be Performed in Foreign Countries. (6) Restriction on Independent Research and Development (IR&D), Bid and Proposal (B&P) and Other Technical Effort (OTE). (7) SBA Certificates of Competency—ASPR 1-705.4 (2) Price Representation in Procurements of $100,000 or Less. (9) Revision to Section XX, Part 3.

Defense Procurement Circular No. 82, August 25, 1970. (1) Equal Employment Opportunity.

RESEARCH REPORTS

Organizations registered for service may obtain microfiche copies of these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

All organizations may purchase microfiche copies (65¢) or full-size copies ($3) of the documents (unless otherwise indicated) from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

All orders to the Clearinghouse must be prepaid.

New Infrared Detector Using Microwave Techniques. P. A. Locke and H. Jacobs, Army Electronics Command, Fort Monmouth, N.J., June 1970, 21 p. AD–706 826.

Pressure Measurements on Four Cone-Cylinder-Flare Configurations at Supersonic Speeds. W. D. Washington and J. A. Humphrey, Army Missile Command, Huntsville, Ala., Oct. 1969, 279 p. AD–699 359.

The Design and Dynamic Balancing of Spinning Models and a Testing Technique for Obtaining Magnus Data in Wind Tunnels. A. S. Platou et al., Army Aberdeen Research and Development Center, Aberdeen Proving Ground, Md., Oct. 1969, 38 p. AD–699 803.

Thermospline: A Program for Computing the Thermodynamic Properties of Steam. C. Ash and J. W. Schot, Naval Ship Research and Development Center, Washington, D.C., Feb. 1970, 82 p. AD–704 089.

Improvement of the Useful Temperature Range of Rubber Shock Mounts. J. D. Ruby, Army Weapons Command, Rock Island, Ill., Feb. 1970, 25 p. AD–703 875.

Medium Strain Rate, Tensile Testing of Selected Plastic Materials. F. P. Stecher, Naval Ordnance Laboratory, White Oak, Md., July 1969, 48 p. AD–701 318.

Chemical Vapor Deposition of Polycrystalline Aluminum Oxide. P. Wong and M. Robinson, Army Materials and Mechanics Research Center, Watertown, Mass., Oct. 1969, 17 p. AD–701 013.

Thermodynamic Properties of Ternary Refractory Carbides, Part I: Zirconium-Niobium-Carbon. C. K. Jun and M. Hoch, Air Force Materials Laboratory, Wright-Patterson AFB, Ohio, Dec. 1969, 40 p. AD–700 765. Also **Part IV: Relations Between Thermodynamic Properties, Bonding, and Compressibility.** M. Hoch and S. Yamauchi, 22 p. AD–700 766.

Development of Compressive Surface Stresses in Slip-Cast Fused Silica. P. A. Ormsby, Army Missile Command, Redstone Arsenal, Ala., June 1969, 60 p. AD–699 815.

Fluerics 28: State-of-the-Art 1969. J. M. Kirshner and R. Gottron, Harry Diamond Laboratories, Washington, D.C., Dec. 1969, 38 p. AD–703 117.

Directory of Points of Contact: Research and Development, Washington, D.C. P. C. Daniels, Office, Chief of Research and Development (Army), Washington, D.C., Apr. 1970, 46 p. AD–704 945.

Use of Atomic Absorption Spectrophotometer for Analysis of Cement. H. H. Chang, Army Engineer Waterways Experiment Sation, Vicksburg, Miss., Mar. 1970, 32 p. AD–704 956.

Ground Effects Machines (GEM). Defense Documentation Center, Alexandria, Va., April 1970, 191 p. AD–704 800.

Manufacturing Methods of Composite Materials. Defense Documentation Center, Alexandria, Va., Feb. 1970, 66 p. AD–701 500.

Cargo Ships. Defense Documentation Center, Alexandria, Va., May 1970, 90 p. AD–705 950.

Lubricants for Use in the Space Environment. Defense Documentation Center, Alexandria, Va., Mar. 1970, 116 p. AD–702 550.

NRL–MB–20B: An Improved Instrument Ball Bearing Lubricant. C. H. Blachly et al., Naval Research Laboratory, Washington, D.C., Mar. 1970, 14 p. AD–704 466.

Prime Contract Awards By State

Military procurement from contractors within the United States totaled $33.6 billion in fiscal year 1970, $5.7 billion less than in FY 1969. This reduced volume impacted on three-fourths of the individual states as dollar-volume declines ranged from a high of $1.0 billion in California, principally the result of reduced aerospace contracts, to a low of $2 million in Maryland.

In addition to California, nine other states were also substantially affected by declining aerospace contracts: Texas, Ohio, Pennsylvania, Connecticut, Massachusetts, New Jersey, Illinois, Missouri and Washington.

Although California reflected the largest dollar volume decline, it again ranked first in military prime contract awards received, as its proportion of total awards rose slightly to 19.6% compared with 19.4% in FY 1969. New York, which had ranked third during the past three years displaced Texas in second position as the dollar volume of contracts awarded in New York remained stable thereby resulting in a proportional increase to 10.3% of total compared with 8.7% last year.

In contrast with the majority of states there were 11 states with increased dollar volumes. Of these, Mississippi and North Dakota had substantial increases reflecting, for Mississippi, a large shipbuilding contract and for North Dakota, a construction contract in support of the Safeguard Missile Program.

Source: Directorate for Information Operations
Office of Assistant Secretary of Defense
(Comptroller)
August 27, 1970

Notes on Coverage

[a] It is emphasized that data on prime contracts by state do not provide any direct indication as to the state in which the actual production work is done. For the majority of contracts with manufacturers, the data reflect the location of the plant where the product will be finally processed and assembled. If processing or assembly is to be performed in more than one plant of a prime contractor, the location shown is the plant where the largest dollar amount of work will take place. Construction contracts are shown for the state where the construction is to be performed. For purchases from wholesale or other distribution firms, the location is the address of the contractor's place of business. For service contracts, the location is generally the place where the service is performed, but for transporation and communications services the home office address is frequently used.

More important is the fact that the reports refer to prime contracts only, and cannot in any way reflect the distribution of the very substantial amount of material and component fabrication and other subcontract work may be done outside the state where final assembly or delivery takes place.

The report includes definitive con-

(Continued on page 18.)

PRIME CONTRACT AWARDS BY STATE

Net Value of Military Procurement Actions by Fiscal Year [a]

Fiscal Years 1967, 1968, 1969 and 1970

(Amounts in Thousands)

State	Fiscal Year 1967		Fiscal Year 1968		Fiscal Year 1969		Fiscal Year 1970	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
TOTAL, U.S.[b]	$41,817,093		$41,241,125		$39,310,186		$33,569,748	
NOT DISTRIBUTED BY STATE [c]	4,435,384		3,992,991		4,061,395		3,793,119	
STATE TOTALS [d]	37,381,709	100.0%	37,248,134	100.0%	35,248,791	100.0%	29,776,629	100.0%
Alabama	297,065	0.8	409,189	1.1	407,726	1.2	315,941	1.1
Alaska	85,648	0.2	106,513	0.3	90,793	0.3	76,285	0.3
Arizona	249,559	0.7	287,065	0.8	343,730	1.0	277,062	0.9
Arkansas	127,180	0.3	121,254	0.3	117,179	0.3	69,823	0.2
California	6,688,812	17.9	6,471,875	17.4	6,824,493	19.4	5,823,799	19.6
Colorado	210,409	0.6	262,753	0.7	243,237	0.7	217,523	0.7
Connecticut	1,935,895	5.2	2,355,135	6.3	1,715,115	4.9	1,237,564	4.2
Delaware	51,672	0.1	42,614	0.1	46,762	0.1	21,613	0.1
District of Columbia	357,666	1.0	349,771	0.9	321,014	0.9	316,109	1.1
Florida	799,005	2.1	975,824	2.6	964,541	2.7	848,750	2.9
Georgia	1,148,355	3.1	964,152	2.6	932,881	2.6	948,974	3.2
Hawaii	65,445	0.2	95,623	0.3	114,608	0.3	109,062	0.4
Idaho	14,772	*	17,051	*	16,054	0.1	10,856	*
Illinois	1,063,776	2.8	932,111	2.5	932,495	2.6	721,277	2.4
Indiana	898,247	2.4	1,107,453	3.0	1,058,557	3.0	906,199	3.0
Iowa	279,328	0.8	260,980	0.7	202,119	0.6	228,197	0.8
Kansas	398,918	1.1	292,293	0.8	349,667	1.0	230,411	0.8
Kentucky	124,294	0.3	60,366	0.2	59,478	0.2	56,538	0.2
Louisiana	656,031	1.8	460,463	1.2	389,857	1.1	299,335	1.0
Maine	56,558	0.2	75,209	0.2	53,408	0.2	55,907	0.2
Maryland	868,396	2.3	703,514	1.9	731,301	2.1	729,042	2.5
Massachusetts	1,422,272	3.8	1,618,741	4.3	1,549,834	4.4	1,199,813	4.0
Michigan	1,033,706	2.8	796,296	2.1	683,215	1.9	562,786	1.9
Minnesota	650,584	1.7	620,297	1.7	741,169	2.1	604,611	2.0
Mississippi	114,800	0.3	369,249	1.0	218,337	0.6	509,069	1.7
Missouri	2,277,597	6.1	1,356,871	3.6	1,095,418	3.1	898,163	3.0
Montana	78,452	0.2	20,453	0.1	21,959	0.1	24,522	0.1
Nebraska	103,522	0.3	120,401	0.3	101,724	0.3	73,345	0.2
Nevada	29,315	*	17,897	*	27,113	0.1	16,333	0.1
New Hampshire	162,551	0.4	155,995	0.4	102,407	0.3	98,747	0.3
New Jersey	1,234,768	3.3	1,108,440	3.0	1,270,460	3.6	1,007,418	3.4
New Mexico	80,472	0.2	87,214	0.2	96,105	0.3	88,007	0.3
New York	3,261,750	8.7	3,483,730	9.4	3,074,340	8.7	3,075,931	10.3
North Carolina	447,608	1.2	487,259	1.3	514,739	1.5	448,709	1.5
North Dakota	16,729	*	68,072	0.2	35,807	0.1	188,783	0.6
Ohio	1,602,593	4.3	1,640,525	4.4	1,533,016	4.4	1,005,808	3.4
Oklahoma	157,350	0.4	164,944	0.4	173,438	0.5	152,342	0.5
Oregon	99,319	0.3	119,719	0.3	85,921	0.2	90,357	0.3
Pennsylvania	1,649,091	4.4	1,727,314	4.6	1,700,396	4.8	1,174,230	3.9
Rhode Island	198,030	0.5	126,362	0.3	119,268	0.3	93,716	0.3
South Carolina	180,777	0.5	133,027	0.4	172,520	0.5	124,304	0.4
South Dakota	9,486	*	33,585	0.1	3,478	*	10,180	*
Tennessee	538,225	1.5	541,631	1.5	485,629	1.4	399,420	1.3
Texas	3,546,978	9.5	4,087,182	11.0	3,525,155	10.0	2,773,927	9.3
Utah	178,850	0.5	131,172	0.4	157,174	0.4	162,387	0.5
Vermont	100,157	0.3	104,957	0.3	85,445	0.2	43,631	0.2
Virginia	665,376	1.8	692,748	1.9	711,232	2.0	634,298	2.1
Washington	606,114	1.6	529,583	1.4	574,761	1.6	384,042	1.3
West Virginia	141,736	0.4	132,002	0.4	66,863	0.2	45,858	0.2
Wisconsin	383,602	1.0	406,409	1.1	393,646	1.1	371,132	1.3
Wyoming	32,868	0.1	14,851	*	13,207	*	14,493	*

For footnote, see page 13.

*Less than 0.05 percent.

by Department [a]

Fiscal Year 1970

Net Value of Civil Functions Procurement Actions [ae]

Fiscal Years 1967, 1968, 1969 and 1970

(Amounts in Thousands)

Army	Navy	Air Force	Defense Supply Agency	Fiscal Year 1967	Fiscal Year 1968	Fiscal Year 1969	Fiscal Year 1970	
$9,170,416	$10,390,632	$10,386,837	$3,621,863	$819,218	$845,295	$684,776	$622,768	TOTAL, U.S.[b]
989,116	1,128,169	1,009,217	666,617	40,875	44,810	41,727	51,903	NOT DISTRIBUTED BY STATE [c]
8,181,300	9,262,463	9,377,620	2,955,246	778,343	800,485	643,049	570,875	STATE TOTALS [d]
165,934	24,744	63,709	61,554	18,441	21,921	20,296	16,777	Alabama
27,733	3,393	39,392	5,767	2,818	7,250	1,364	2,656	Alaska
123,775	50,640	93,663	8,984	2,742	6,381	275	656	Arizona
29,097	3,098	11,765	25,863	81,658	67,525	50,267	26,068	Arkansas
893,590	2,022,808	2,350,292	557,109	52,991	56,465	53,850	53,906	California
49,722	28,020	124,058	15,723	1,539	3,471	2,616	2,240	Colorado
274,902	559,742	375,584	27,336	7,212	5,761	6,010	5,878	Connecticut
2,863	2,145	2,483	14,122	12,658	6,024	3,929	5,019	Delaware
87,186	171,387	39,223	18,313	1,071	299	1,799	499	District of Columbia
215,483	122,842	470,055	40,370	35,334	30,439	23,654	12,182	Florida
67,679	31,621	812,595	37,079	9,390	15,333	6,432	4,512	Georgia
36,930	39,854	21,296	10,982	244	711	4,338	1,540	Hawaii
1,363	—116	5,406	4,203	19,556	26,290	33,375	32,186	Idaho
339,944	82,750	119,559	179,024	18,046	25,919	29,285	23,699	Illinois
556,197	105,970	197,501	46,531	18,052	21,627	11,127	21,354	Indiana
75,698	26,745	76,670	49,084	14,578	12,705	12,421	5,959	Iowa
105,703	2,562	99,752	22,394	11,611	7,153	9,256	8,565	Kansas
23,437	2,421	5,074	25,606	21,701	19,438	11,378	7,576	Kentucky
84,692	89,427	7,455	117,761	40,600	41,074	25,751	35,501	Louisiana
16,419	30,887	2,004	6,597	1,326	1,087	749	198	Maine
156,711	358,846	187,813	25,672	1,716	4,055	2,308	1,880	Maryland
377,751	371,438	378,853	71,771	2,703	4,879	2,058	2,423	Massachusetts
365,147	40,819	81,757	75,063	10,915	8,050	8,727	7,181	Michigan
176,920	187,244	215,542	24,905	3,902	4,398	5,347	496	Minnesota
8,037	460,220	8,133	32,679	18,300	10,586	9,631	36,791	Mississippi
222,197	441,087	198,459	36,420	30,941	26,417	25,186	13,123	Missouri
11,993	86	8,344	4,099	21,840	52,656	45,139	46,158	Montana
41,695	533	18,647	12,470	6,112	6,860	3,378	3,930	Nebraska
3,503	650	10,587	1,593	17	33	87	49	Nevada
6,067	67,510	9,966	15,204	107	156	238	281	New Hampshire
344,233	352,668	170,102	140,415	2,163	4,388	3,773	5,235	New Jersey
46,997	3,632	30,601	6,777	5,955	9,157	5,755	3,284	New Mexico
562,763	1,775,175	536,161	201,832	8,351	14,726	13,955	10,639	New York
263,852	86,621	23,867	74,369	3,534	3,329	3,285	3,737	North Carolina
142,565	6,388	28,445	11,385	2,151	1,462	2,667	3,255	North Dakota
259,918	243,074	420,815	82,001	12,442	18,639	22,795	25,456	Ohio
22,628	9,319	74,578	45,817	48,773	51,698	34,197	28,906	Oklahoma
6,364	45,500	6,305	32,188	44,354	29,995	15,332	11,991	Oregon
449,346	341,978	239,268	143,638	37,760	30,445	30,072	30,986	Pennsylvania
26,839	53,000	3,571	10,306	574	4,234	4,303	4,155	Rhode Island
32,515	41,399	15,214	35,176	2,571	4,151	3,130	3,943	South Carolina
2,190	112	4,540	3,338	2,249	1,662	1,837	1,898	South Dakota
235,787	35,158	73,998	54,477	14,039	12,141	7,258	4,007	Tennessee
656,715	447,122	1,288,473	381,617	28,317	32,503	26,722	17,451	Texas
20,854	14,361	102,694	24,478	0	25	142	249	Utah
25,952	3,474	13,375	830	90	101	385	1,064	Vermont
205,104	362,024	36,486	30,684	8,764	8,992	3,761	4,306	Virginia
21,876	79,988	239,938	42,240	58,974	54,128	37,457	15,135	Washington
23,784	5,095	710	16,269	24,039	18,937	9,728	10,855	West Virginia
282,562	26,981	24,489	37,100	5,122	4,775	6,203	5,004	Wisconsin
88	21	8,353	6,031	0	34	21	26	Wyoming

tracts and funded portions of letter contracts and letters of intent, job orders, task orders, and purchase orders on industrial firms, and also includes interdepartmental purchases, made from or through other governmental agencies, such as those made through the General Services Administration. The state data include upward or downward revisions and adjustments of $10,000 or more, such as cancellations, price changes supplemental agreements, amendments, etc.

The estimated amounts of indefinite delivery, open-end or call type contracts for petroleum are included in the report. Except for petroleum contracts, the report does not include indefinite delivery, open-end, or call type contracts as such, but does include specific purchases or delivery orders of $10,000 or more which are placed against these contracts. Also excluded from the report are project orders, that is production orders issued to Government-owned-and-operated facilities such as Navy shipyards. However, the report includes the contracts placed with industry by the Government-operated facility to complete the production order.

[b] Includes all contracts awarded for work performance in the United States. The United States includes the 50 states, the District of Columbia, U.S. possessions, the Canal Zone, the Commonwealth of Puerto Rico, and other areas subject to the complete sovereignty of the U.S., but does not include occupied Japanese Islands and Trust Territories.

[c] Includes contracts of less than $10,000, all contracts awarded for work performance in the Commonwealth of Puerto Rico, U.S. possessions, and other areas subject to the complete sovereignty of the U.S., contracts which are in a classified location, and any intragovernmental contracts entered into overseas.

[d] Net value of contracts of $10,000 or more for work in each state and the District of Columbia.

[e] Civil functions of the Army Corps of Engineers for flood control and rivers and harbors work. Civil functions data are shown separately, and are not included in military functions tabulations.

New Architect-Engineer Selection Method Tested

In the interest of enhancing technical competition in procurement of architect-engineer (A–E) services, DOD is considering revising procedures for selecting A–E contractors.

Under the proposed procedures, invitations would be issued to three well qualified firms selected under current procedures. A–E firms would submit competitive technical proposals, accompanied by lump sum price estimates, without price breakdown, in response to the invitation.

A year of tests of the proposed procedures will precede changes to the Armed Services Procurement Regulation (ASPR). Begun in August, the tests are being conducted by the U.S. Army Engineer District, Sacramento, Calif., and the Southern Division, Naval Facilities Engineering Command, Charleston, S.C. The tests apply to A–E awards of $10,000 or more.

Selected A–E firms will be advised that invitations and their proposals are confidential to the Government. They will not constitute a commitment by the Government or the firm. They will not be considered as bids, but simply estimates to accomplish the work as understood by the selected firms.

Price estimates will be kept in sealed envelopes, and will receive secondary consideration after technical evaluations (and rankings) of the proposals have been completed.

It is not anticipated that price estimates will play a predominant role in source selection. The selection board would determine, however, if price considerations would warrant changing relative ranking of the A–E firms.

Negotiations then would be conducted with the selected firm. A contract would be awarded under current procedures.

The extent of detail that an A–E firm submits in his technical proposal would necessarily vary in relation to the nature of the work, monetary value, and complexity of the project. The technical proposal need not provide expensive sketches, preliminary designs, drawings, renderings, or design computations.

Current methods prescribed by the ASPR require a selection board to recommend a minimum of three firms, in order of preference, for approval for contract negotiations, without benefit of technical proposals or price estimates. The proposed method retains technical considerations as the principal factor in making awards. The proposed procedures resulted from a joint review made by the Office of the Assistant Secretary of Defense (Installations and Logistics) and the Military Departments earlier this year.

Army Engineers Establish Advisory Environment Board

An Environmental Advisory Board has been established by the Army Chief of Engineers. Members of the group include:

Dr. Lyton K. Caldwell, professor of political science at Indiana University and author of books and papers on the political and institutional aspects of environmental problems.

Roland Clement, ecologist and vice president of the National Audubon Society, New York City.

Dr. Charles H.W. Foster, executive director, New England Resources Center, Boston; former Commissioner, Natural Resources for Massachusetts; former research associate, Conservation Foundation; member of President Nixon's post-election Environmental Task Force.

Harold Gilliam, author, environmental reporter for the San Francisco *Chronicle;* consultant to various Government agencies.

Richard H. Pough, engineer, conservationist; chairman of the board, Open Space Action Institute, and America the Beautiful Fund, New York; author of several books and articles.

Charles H. Stoddard, environmental consultant and former director, Bureau of Land Management, Department of the Interior; former executive director, Citizens Committee on Outdoor Recreation and Natural Beauty; staff member Resources for the Future, Inc.; consultant; author on conservation and resource management.

FROM THE SPEAKERS ROSTRUM

Interdependence

Excerpts from address by Gen. F. J. Chesarek, USA, Commanding General, Army Materiel Command, Washington, D.C., at Annual Conference of the Armed Forces Management Assn., Los Angeles, Calif., Aug. 20, 1970.

It is one of the truisms of our time that revolutionary developments in communications and transportation have shrunk the globe, with distances between formerly faraway countries being reduced to mere hours of flight time.

Statesmen pay continuous lip service to the axiom that relations among states—even among continents—are interdependence rather than independence. But while every political writer and speaker belabors this point ad nauseam, they actually deal with the Middle East, Latin America, the Atlantic Region, Eastern Europe, Northeast Asia, and Southeast Asia as if we were still living in the World War II era, when time-distance factors made it realistic to speak of a European, an India-Burma-China, a Pacific "strategic theater" as essentially separate and autonomous.

Our foreign affairs people understand the phenomenon of interdependence quite well and are aware that the whole globe has, in fact, become a single strategic theater. In practice, however, management compartmentalization prevents application of theory. For example, those who may be knowledgeable regarding the strategically important Trucial Oman probably know little or nothing about NATO, and those who are experts on Berlin have no interest in Korea.

It doesn't take a lot of imagination, however, to sketch the interconnection of seemingly isolated developments in geographically separated areas into an interconnected mosaic. But unless this is done consciously, no applicable alternatives are invented, much less considered.

General Lyman Lemnitzer, long-time Supreme Commander of Allied Forces in Europe, pondered this same point in a recent address to the graduating class of the Army War College. I quote some of his pertinent observations:

> "First, there is the matter of working effectively with our Allies. I have touched on some of the reasons why Allied cooperation is becoming more and more important—and in some ways, more difficult—than ever before. This importance applies across the entire spectrum of our relations with Allies—from the cooperation of the forces of highly developed nations in a sophisticated military environment, such as the North Atlantic Treaty Organization, to the advisory relationships within developing countries such as those in Southeast Asia.
>
> "In dealing with these intricate matters, it is not enough to master the organization and materiel and doctrine which suit the military temperament and specific needs of *United States* forces. There must also be an understanding of the psychological, technological, and political outlook and capabilities of the people with whom we want to work. This includes an ability to recognize and comprehend *their* objectives, *their* aspirations, and the political, economic, and psychological constraints under which *they* must operate. In brief, the effective senior officer today must have a full and sophisticated understanding not only of the military aspects of strategy, but of the political dimensions of strategy as well."

Gen. F. J. Chesarek

Robert Delaney, President of the Thunderbird Graduate School of International Management, says that:

> "We are entering the post-industrial age. We are moving onto new ground in a world of multi-national techno-economics. Beyond this, and perhaps basic to all of it, is the dramatic influence and persuasive force of the world-wide communications revolution which brings civilizations, cultures, and peoples into direct confrontation for the first time in history.
>
> "This is startling enough

> to contemplate. But, accepting this reality and relating it to the organizational forms we have forged to accommodate both the 19th century industrial revolution and the 20th century technological advance, leaves us totally unprepared for the mind-blowing world of tomorrow.
>
> "When one contemplates the cumulative social and economic thrust of computer technology, marketing simulation and game theory, communications satellites, the world information grid, micro- and macro-economics and the development of transnational corporations as well as the development of the third world, you but begin to peek under the tent of business and industry in the seventies and the eighties."

Business management must recognize and prepare for this. Their interests must be integrated with those of their customers, and their organizational structure must be susceptible to integration by some effective mechanism. Functional organizations—the panacea for corporations in the past few decades—are being reexamined critically in business and in schools because of our awareness of the lack of integrative systems short of the top dog. Howard Carlisle, head of the Department of Business Administration at Utah Sate University, in addressing this problem, stated recently that functional organizations tend to emphasize the separate functional elements at the expense of the whole organization and its objectives. He could also have added at the expense of customers, too.

While on the subject of expense, there is a new book on the market titled, "George Washington's Expense Account," by Marvin Kitman. A recently published review by Day Thorpe highlighted the following tidbits.

> "When George Washington was elected commander in chief of the Continental Army in June 1775, he declined the proffered salary of $500 a month and delivered the noble words written by his speechwriter, Edmund Pendleton:
>
> 'As to pay, Sir, I beg leave to assure the Congress that as no pecuniary consideration could have tempted me to have accepted this Arduous employment (at the expense of my domestic ease and happiness) I do not wish to make any proffit from it. I will keep an exact account of my expences. Those I doubt not they will discharge, and that is all I desire.'
>
> "Eight years later, General Washington turned in his expense account for $449,261.51, an amount which included interest at 6 percent."

I might add that here is probably recorded the first cost overrun—1,000 percent.

> "Kitman lists a few of Washington's rules for a model expense account:
>
> '1. Omit nothing. When in doubt, charge anyway. Put it on the train to Westport, and see if it gets off.
>
> '2. Be specific on the smaller expenditures and vague on the larger ones. Describe in some depth the purchase of a ball of twine, but casually throw in the line 'Dinner for one army'.
>
> '3. Whenever possible, intermingle personal and business expenses.
>
> '4. Pick up the check for one's associates. Washington was perhaps generous to a fault in this matter.
>
> '5. Above all be reasonable. Know what the market will bear.' "

* * * * *

Within the Defense establishment, the concept of interdependence of forces in the field has long been recognized and applied, with varying measures of success. We have unified commands with authority to mesh the combat power of all the military services against the enemy.

As an example at a lower level, I never cease to be impressed with the infantry-artillery team where several battalions of artillery concentrate their fires in support of a single infantry maneuvering element. All the liaison, coordination, and communication are done according to a plan. There can be no misunderstanding about who does what or when. The infantry relies on its Red Leg brothers to assist it wherever and whenever the need arises. Field artillery and infantrymen know this is one of the most complex operations they have to handle, and they learn the procedures early in their careers and practice them throughout. It is the application of interdependence at its greatest peak of efficiency during combat with lives at stake.

In the area of Defense management, some work has been under way for years within the various functional areas to reap the fruits of interservice interdependence, but little has been done on a broader front.

The establishment in 1952 of this Association is one tangible example of seeking to exchange knowledge and ideas among Defense managers at all levels and between the military services and our industrial colleagues.

In my view, the potential benefits have not been realized because of too much lip service and too little attention and action. . . . While mouthing the necessity to address our mutual problems on a total systems approach, we proceed too often in exactly the opposite direction.

Interdependence has often been interpreted in military service circles, and also in the business community, as a sort of semantic tactic meaning just the opposie—*total* dependence on someone else, in the same manner that a Communist People's Republic in effect means total authoritarian rule.

Within each military service, simple coordination is both a difficult and time-consuming process between the functional chiefs. While the concept of interdependence is recognized and practiced to some extent, the natural human reaction against dependence on someone else frequently obscures the necessity of interdependence in order to function at all.

In the Army, we created in 1967 the Office of the Assistant Vice Chief of Staff to integrate the efforts of the Army staff functional managers and to act as the program manager for the Army. In its three years of existence, this office has been perfecting its techniques, so that Professor Carlisle's observation on functional management has been corrected in considerable measure by creation of a bridging mechanism. The bridging mechanism cannot be successful if it functions as a super staff. It must draw on the functional divisions, coordinate and synthesize their work, and by its own analytical and professional expertise produce results which can stand assaults from within and without. This is the application of integration which, in turn, rests upon the conscious understanding of functional interdependence.

* * * * *

Major changes are in the wind. The Defense Blue Ribbon Panel has recently issued its report proposing a revolution in Defense Department structuring, organization, management, and operations. We are facing severe financial restraints and force reductions. The Nixon Doctrine is gradually unfolding, with consequences not yet clearly discernible. The Soviet Union's military strength continues to grow. Our domestic base is in turmoil, with the Defense Department strung up as the whipping boy.

The advent of an era of dramatic change must bring forth a supercharge of adrenalin on the part of managers at all levels to meet the challenge. This is not a time for despair or for marking time until the scene stabilizes. It never will. We need imagination, innovation, initiative, good old American drive, and determination to adjust to changes and to challenge unfounded criticism. We must build on our strengths, overcome our weaknesses, and come out the better for it.

There is only one way this can be done—to pull as a team—to recognize our interdependence on each other and to create a pipeline for ideas and talent to flow both up, down, and laterally.

* * * * *

Gentlemen, no greater opportunity will ever occur to weld Defense management into a cohesive whole. We need only recognize and respond to this fact, and the country and the free world will be our grateful sponsors.

U.S. Army Navigational Requirements

Presentation by Lt. Col. John A. Fambrough, Staff Officer, Hq., U.S. Army Combat Developments Command, Ft. Belvoir, Va., at the Assn. of the U.S. Army Airmobility Symposium, Ft. Rucker, Ala., Aug. 4, 1970.

Lieutenant Colonel John A. Fambrough II is an avionics staff officer in the Electronics Division, Directorate of Materiel, Combat Developments Command, Ft. Belvoir, Va. He has held avionics assignments in Vietnam and with the U.S. Army Electronics Command. He holds a bachelor of science degree from Texas A and I College. He is a graduate of the Army Command and General Staff College.

We are here for the specific purpose of presenting what we in the Army feel are our most urgent navigation requirements, and to solicit industry's support in helping us satisfy these requirements. Note that I said "most urgent requirements." It is not feasible to discuss, or even mention, all of the requirements we have for navigation and positioning equipment. There are in excess of 40 formal requirements documents for navigation position devices.

To illustrate the point that we have far too many requirements for separate systems, the following is a partial listing of Army requirements for navigation position devices:

- Position-Fixing and Navigation System.
- Long Range Position Determining System.
- Survey System, Azimuth Gyro, Lightweight.
- Navigator, Lightweight, Self-Contained.
- Direction and Position Indicating Instrument.
- Navigator, Doppler Radar, Self-Contained.
- Portable Navigation Aid.
- Remote Area Approach and Landing System
- Marine Lighterage Guidance System.
- Position Locator and Navigation Equipment (P).
- Navigation Display for Army Aircraft.

What we are striving for now is a common position and navigation system which will fulfill the great majority of these requirements. In recognition of this requirement, the Department of the Army has established a Project Manager's Office for Navigation and Control Systems at Fort Monmouth, N.J., with responsibility for management of existing and planned tasks to meet:

- Ground, marine and airborne requirements of the Army for position locating (or fixing) and navigation.
- Army requirements for air traffic control in accordance with DOD Directive 5010.14, Army Regulation 70–17, Army Materiel Command Regulation 11–16, and other pertinent regulations.

In addition, the Joint Staff has recently published a Master Navigation Plan which will serve as a guide to the development of future navigation systems. A study of what has been done to fulfill the requirements reveals that considerable effort has been exerted in recent years toward solving problems of locating and navigating aircraft, and that the efforts to develop a common navigation and position system began in earnest with the development and testing of the Position Fixing Navigation System (PFNS). Although the PFNS was found to be unacceptable for Army use, much valuable information was produced by the tests. This information provides a portion of the data being applied by the Navigation and Control Systems Project Manager toward fulfilling our ultimate objective. That objective is to design a system or systems which will provide instant, continual, and current positioning and navigation information on a worldwide basis for all Army users—ground, marine, and airborne.

We recognize that the current state of the art is not capable of producing a single common tactical navigation system that will fulfill all of the current operational requirements. Therefore, the Army has selected LORAN, a hyperbolic radio system, as the most promising means of satisfying many of the requirements. LORAN is the acronym for long range navigation. This will allow us to field equipment in the near future, while we continue to work on advanced systems which offer us the ultimate capability we are seeking—more sophisticated area navigation systems, such as inertial guidance, and eventually the possible extensive use of satellite navigation systems.

In order to place these requirements in perspective, I have chosen to relate this presentation to an aircraft system which we expect to become operational. The Utility Tactical Transport Aircraft System (UTTAS) is scheduled to replace the UH-1 beginning in the late 1970s. There have been numerous studies conducted to determine what the essential navigation capabilities of the UTTAS should be. We must be realistic in this determination, particularly with respect to cost effectiveness. I don't have to remind you that the Army is going to feel the squeeze of reduced defense spending during the next several years. We are feeling it now.

Consequently, we must define our requirements very carefully, and constantly ensure that research and development dollars are spent wisely.

We are faced with the challenge of providing aviation support during all conditions of weather and visibility that the soldier can fight in, and that remains our ultimate goal.

However, we realize that this goal cannot be fully achieved in the austere budgetary climate we are entering. Therefore, we must develop the best capability possible within the established budgetary limitations. Thus, we have determined that to provide the maximum support under the forecast dollar ceilings, we must have, and can probably afford, to field a fleet of UTTAS with the following navigation systems:

- Low level tactical navigation system.
- Automatic direction finding (ADF).
- VHF/FM homing.
- Complete provisions for omni, glide slope, localizer and marker beacon.

In evaluating these requirements, it is apparent that the most urgent is the development of a navigation system that will provide accurate navigation and position information at all altitudes. In particular, it must provide accurate navigation during nap-of-the-earth operations. This requirement is predicated upon the assumption that in future conflicts, regardless of intensity, Army aviation will be operating in an active air defense artillery environment. We *must* operate at tree-top level because this is the only segment of airspace which affords any degree of protection from radar intercept and vulnerability to destruction by air defense weapons.

We know also that the Army must develop a navigation and position location system for use by ground and marine forces, and for artillery survey purposes.

In consideration of the multitude of requirements for precise navigation and position information in the air and on the ground, the Army has established as its first priority a requirement for a common navigation system which can satisfy a great number of the many requirements. We have determined that the system which can fulfill this requirement in the near future is LORAN.

The next question that occurs is what kind of LORAN. What should it look like? How big? How reliable? How maintainable? What functions? And many other questions.

Unfortunately, this information is not available now because it has not been synthesized from the studies currently underway. We can tell you, however, that we have identified the following general requirements categories for navigation and position fixing:

- Engineering and artillery precise positioning.
- Surveillance and target acquisition positioning.
- Ground mobility navigation and positioning.
- Aircraft navigation and positioning.
- Marine craft navigation and positioning.

In more detail, aircraft navigation and positions requirements are:

- Tactical enroute navigation.
- Position fixing.
- Destination location.
- Let down to attended area.
- Let down to unattended area.
- Civil enroute navigation.
- Civil approach.

The foregoing offers another portrayal of why the Army is seeking a common navigation-position location system. We will be hard pressed to field the equipment in time to meet first UTTAS production. We solicit industry's energetic support and the application of its resources in meeting our milestones.

Current technology is capable of providing the Army with a common navigation and position location system which will greatly enhance military operation in the air, on the ground, and on the waterways. We are looking to industry to provide that technology.

Let us move now to other requirements. First, we need a tactical instrument landing system (ILS) capability. LORAN can provide accurate enroute navigation, but we must be able to execute an approach and landing to a designated landing zone during instrument conditions or during hours of darkness. There are currently several commercial versions of remote area approach and landing systems which meet many of the stated operational characteristics of the requirement. In addition, the Army Materiel Command has an active program which could provide a remote area approach system by 1974. Essentially, we want a system that provides the following:

- Weight: airborne receiver—20 pounds; ground transmitter—not more than two packages, each not more than 35 pounds.
- Range, glide slope, and azimuth information to permit approach to the ground station from any direction.
- Azimuth lock-on to an aircraft to a range of 10 miles at 200 feet above the ground.
- Glide slope angles selectable between zero degrees to 15 degrees.
- Ground equipment must provide immediate indication of system error or failure.
- High reliability—a mean-time-between-failures of 500 hours.

Automatic direction finding (ADF) will be with us for several years to come. In this area, we are well along toward fulfilling the requirement. The AN/TRN-30 (Tactical/Semi-Fixed Equipment) is expected to be in the field by 1973. We have very high confidence in its ability to fulfill our tactical ADF requirements until the common navigation system is fielded.

Unfortunately, we are not in such a favorable position in the area of FM homing. FM homing will continue to be a requirement for the foreseeable future. FM homing is most advantageous to the Army because our tactical ground radios employ FM, and the antenna weight and cost requirements are low as compared to HF or UHF homing, or ADF antennas. The Army's past experiences with FM homing have not been very gratifying. We have yet to field a system which provides the accuracy and reliability desired. Perhaps the reason for this failing is a result of our attempts to apply one antenna to several types of aircraft. It appears that a concentrated effort in aircraft antenna design and airframe electronic compatibility will be the only way to solve the problems inherent in our present FM homing systems. We are confident that the electronics and aircraft industry can make valuable contributions to this endeavor. We do need industry support in improving the FM homing capability in Army aircraft.

The following UTTAS navigational requirement are those which the Army considers essential:

- Landing assist night vision device.
- Terrain avoidance/terrain following.
- Station keeping for formation flying.
- Self-contained landing system.

All of the essential avionics, including communications, we estimate will weigh almost 300 pounds and represent about 25 percent of the total fly-away cost. Naturally, we hope for breakthroughs which will reduce both the costs and the weight. As I mentioned at the outset, these limited capabilities we categorize as essential do not meet our requirements of operation in the same visibility environment as the ground soldier.

Accordingly, we will include complete provisions for a navigational package that will fully meet operational requirements for the proposed time frame of the UTTAS, and hope that the state of the art improves to the point where newly developed equipment will be relatively inexpensive and reliable.

As a final subject for your consideration, I would like to mention night vision devices. If we are to provide sustained day-night support to combat operations, we must be able to perform during the hours of darkness as well as during daylight. Considerable effort and money have been expended by both the military services and industry toward night vision devices.

Image intensification, low light level television, radar and forward looking infrared systems have been developed, tested, and deployed to Southeast Asia. We are pleased with the progress made thus far, and we intend to continue to explore the various uses and capabilities of our current night vision systems. We have made significant breakthroughs in night vision performance, and our main concern with the technology is in reducing the weight, size, complexity, and cost, and in developing new applications, such as navigation, positioning, and approach capabilities. An optimum night vision system might well provide the capability for terrain avoidance, station keeping, and remote area landing system for all Army aircraft. The ability to see at night and in adverse weather will make night operations routine and result in reduced vulnerability of our helicopter fleet to visually sighted weapons.

I have provided you with "user" information—information from which you can direct your efforts and resources in the research and development area of navigation. We of the Army Combat Developments Command and the entire Army aviation family are confident that together we can produce the vision to victory.

Flare Test Range Opened

A Pyrotechnic Evaluation Range has been established at the Army's Yuma Proving Ground, Yuma, Arizona. The range measures and records effective ground illumination during deployment of pyrotechnic flares, eliminating the need for theoretical computations, an integral part of previous tests.

The range contains 361 photocell sensor positions located in a rectangular pattern in a field measuring 1.5 by 1.5 miles. The sensors can respond to light levels above 0.05 to 0.20 foot-candles, the current DOD design criteria. A display panel in the central control building shows the pattern of sensors triggered by the flare being tested. The pattern is photographed and correlated with test data from cinetheodolite tracking cameras. The cameras complete the engineering description of flare performance as to position in space and light pattern on the ground.

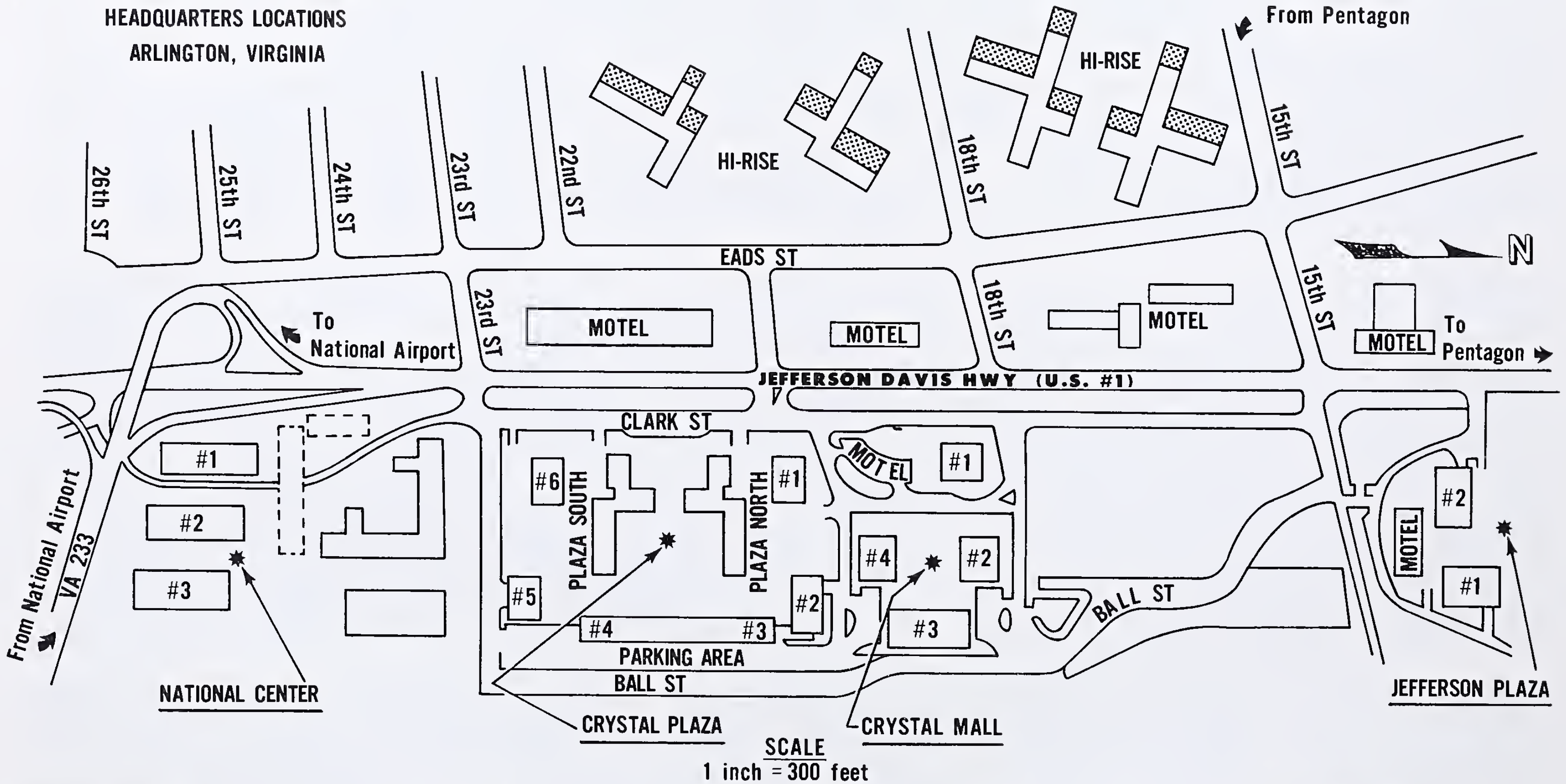
Navy Offices Moved

Naval Material Command and subordinate systems commands headquarters have completed their moves from Main Navy and Munitions buildings to Arlington, Va. The map on the following page locates the headquarters in relation to the Pentagon and National Airport.

NAVAL MATERIAL COMMAND

HEADQUARTERS LOCATIONS

ARLINGTON, VIRGINIA



National Center

#1 ELECTRONIC SYSTEMS COMMAND

#2 ORDNANCE SYSTEMS COMMAND

#3 SHIPS SYSTEMS COMMAND

Crystal Plaza

#5 NAVAL MATERIAL COMMAND

#6 ADMINISTRATIVE OFFICE

Crystal Mall

#3 SUPPLY SYSTEMS COMMAND

Jefferson Plaza

#1 & 2 AIR SYSTEMS COMMAND

9/70

Army Will Test Industry Developed STANO Items

Lieutenant Colonel Victor H. Bray, USA

Project MASSTER (Mobile Army Sensor System, Test Evaluation and Review) is designed to provide the Army a capability to sift and sort the myriad of material items, systems and concepts proposed for surveillance, target acquisition and night observation (STANO). Basically Project MASSTER responds to Army needs in two ways. It responds to the Army Materiel Command by testing material. It responds to the Army Combat Developments Command by testing doctrine and concepts for employing the material.

Activities to date have been concentrated on Army developed or sponsored materiel and ideas. But this is not the limit of Project MASSTER's interest. Recognizing the great potential of U.S. industry and its significant contribution to Army requirements in the past, special procedures were established to expedite review of industry test requests, decisions to test, review of test results, and decisions concerning future use of STANO-related material and concepts.

This article explains these procedures. It addresses the general concept of how the Army processes an unsolicited request for test of STANO-related material, who can approve or disapprove, how the requester can learn the status of his request, and what the requester can do to expedite the process.

A request for test from a non-government source should be sent to the Army Materiel Command (AMC), where the unsolicited proposals office assigns a control number and determines if a Memorandum of Understanding between the Government and the requester exists. This document is required by Army Regulation 27-60, paragraph 304b.*

A Memorandum of Understanding states:

> "It is understood that the Department of the Army has accepted the above proposal for the purpose of evaluating it and advising of any possible Army interest, provided that the acceptance to determine such interest does not imply or create a promise to pay; an obligation to give up any legal right or to assume any duty; a recognition of novelty, originality or priority; or any express or implied contractual obligation or other relationship such as would render the Government liable to pay for or to give up any legal right or assume any obligation for any disclosure, evaluation or use of any information in the proposal to which the Government would otherwise lawfully be entitled."

If a Memorandum of Understanding between the requester and the Government is required and not already existing, the request is put aside until the memorandum has been obtained from the requester. When the Memorandum of Understanding is in hand, AMC initiates a technical evaluation of the proposal. At the same time, AMC forwards a copy of the request to the Combat Developments Command (CDC). The AMC technical evaluation considers:

Completeness of the Request. It should contain, as a minimum, detailed technical description of the ma-

Lieutenant Colonel Victor H. Bray, USA, is Staff Officer, Test and Evaluation Branch, Management and Evaluation Division, Office of the Chief of Research and Development, Department of the Army. Previously, he served as commanding officer of a Field Artillery Battalion, and as a project officer, Institute of Combined Arms and Support, Army Combat Development Command. He holds a bachelor of general education from Omaha University, and has attended the Army Command and General Staff College and the Armed Forces Staff College.

Army Regulations cited in this article may be obtained from the Commanding Officer, U.S. Army Publication Agency, Attention: AGDD-I, Washington, D.C. 20315.

teriel, its capabilities and military potential, restrictions under which technical data and any proprietary rights represented in the materiel will be released to the Army, a summary of any previous government tests/evaluations, and a proposed test plan.

Military Potential. STANO-related materiel proposed to be tested must have potential military utility. The request should include performance characteristics and configuration for its probable use environment. (The materiel need not satisfy an existing Qualitative Materiel Requirement (QMR) or Small Development Requirement (SDR), but should be oriented toward the satisfaction of a military materiel requirement or objective.)

Development Status. STANO-related materiel proposed for test must have been developed and fabricated to a point whereby testing at the proposed time would accomplish a useful result for the Army.

Facility Requirements. Facility requirements for test and evaluation must be compatible with the test capabilities of Project MASSTER.

Simultaneously with the AMC technical evaluation, CDC will review the request package. The CDC review determines if the materiel proposed for test meets a military requirement. If it does, and no approved requirements document exists, CDC must develop an appropriate document or determine if the materiel proposed for test should undergo functional and organizational experimentation and/or field exercise tests at Project MASSTER.

General Categories of STANO Items

Night Vision Devices
Surveillance Aircraft
Personnel Detectors
Equipment Detectors
Radars
Ground Sensors
Photographic Equipment
Optical Equipment
Aural Equipment
Electronic Surveillance Equipment
Information Transmission, Identification and Positioning Devices & Systems
Test, Measurement & Diagnostic Equipment

Test Conditions

If directed to test, Project MASSTER will contact the requester to obtain an agreement for testing conditions. The agreement document is called a Test and Bailment Agreement. It specifies security requirements and stipulates specific rights and liabilities concerning administration, logistics, operation, test data usage, equipment damage, personnel injury, schedules and costs. As a condition for Army agreement to test, the Test and Bailment Agreement stipulates that the requester agrees to:

- Deliver the required test materiel, in the proper quantities at a prescribed time, to the designated test site. (Costs associated with delivery and testing of the materiel will have to be negotiated on a case-by-case basis; however, normally delivery costs will be borne by the non-government source.)
- Perform receiving inspection of the materiel at the test site and make certain that it is in operating condition.
- Provide written operating procedures and operator training, if required.
- Provide necessary and timely maintenance, maintenance documentation, and maintenance support, to include all parts and labor, for materiel furnished.
- Remove the test materiel from the test site at the completion of the test operation or upon demand by the Government.
- A disclaimer of government liability for loss or damage to persons or property.

Within 25 days of test completion, AMC will convene a review board consisting of representatives from AMC (the developer), CDC (representing the user), Continental Army Command (the trainer), and the Logistics Doctrine, Systems, and Readiness Agency (representing the logistician). This board meets in an in-process review in accordance with provisions of Army Regulation 705–5.

It is the responsibility of the review board to evaluate test results, Project MASSTER recommendations, and the requirements against which the materiel was tested. Following the evaluation, a recommendation is made to Headquarters, Department of the Army, concerning the future of the tested materiel. The board will either recommend where in the Army's materiel life cycle (prescribed in Army Regulation 11–25) the materiel should be placed, or recommend that no further consideration be given to the proposal. The range of recommendations to continue consideration of the proposed materiel go from entry into advanced or engineering development to acceptance as standard Army materiel (Army Regulation 71–6).

Headquarters, Department of the Army, will consider the review board's recommendations and make the final determination.

Positive Control

The procedures described here were designed to provide for a normal flow toward acceptance of the request for test and testing. More effort is required to deny the request than to allow it to go through the process, except when the requester fails to provide sufficient information.

Positive controls have been established to ensure that requests are processed speedily and not lost in the "administrative mill." Immediately upon receipt of a request, a sequential control number is assigned. This number remains as the identifying number of the request until it is dropped from Army accountability. A decision to drop from accountability must be fully documented. A quarterly report showing the status of all requests is provided to the STANO Systems Manager with information copies to other Department of the Army staff elements, members of the review board, and Project Director, Project MASSTER.

Army procedures require communication with the non-government requester. Following receipt of the request at Headquarters, AMC, the requester will be notified that his request has been received and that it will be evaluated or, as previously mentioned, that further processing of his request will be held in suspense until a Memorandum of Understanding has been signed and delivered to AMC.

Following completion of the AMC and CDC reviews, AMC will provide the requester with the results of the technical evaluation and combat developments review and advise him either that the evaluation is terminated or that testing will be conducted at Project MASSTER. In the latter case, the requester will be informed that test guidance is being provided to Project MASSTER through the STANO Systems Manager at Headquarters, Department of the Army, and that the Project Director, Project MASSTER, will contact him for execution of the Testing and Bailment Agreement. When Headquarters, Department of the Army, has provided AMC with a decision on the future of the tested materiel, AMC must notify all concerned, including the requester, of the decision.

The preceding discussion has concerned AMC and CDC handling of test requests from non-government sources. Similar procedures are in effect for the Army Security Agency (ASA). The basic difference is that ASA is responsible for both development and user representation. Therefore, the exchange of information between these two function elements is internal to ASA.

These procedures may seem rather drawn out and time consuming. However, each step has been a candidate for elimination and has survived a critical examination made considering interests of both the Government and the non-government requester. The surviving steps provide positive controls to prevent inadvertent rejection of a request, to ensure economy of resources to prevent expending effort where there is no military requirement or to cover ground previously covered, and to allow testing to be worked into the Project MASSTER schedule.

What Requester Must Do

There are several steps which can be taken by the test requester to expedite consideration of his request and testing of his materiel. First, of course, he must submit a complete package, as described earlier. Second, he can ensure that the request gets to the proper place.

Test requests for non-ASA items should be forwarded to:

Commanding General
U.S. Army Materiel Command
Attn: AMCRD–PS–P
Room 2739, Building T–7
Washington, D.C. 20315
Phone: (202) 697–5883
or 697–6075

Test requests for ASA items should be forwarded to:

Commanding General
U.S. Army Security Agency
Attn: IARD–T
Room 2020, Building A
Arlington Hall Station,
Va. 22212
Phone: (202) 692–5165

Third, the requester can include the required Memorandum of Understanding with his proposal. Fourth, he can provide a minimum of five copies of the entire package to AMC (two of these will stay in AMC, two will go to CDC, and one will go to Project MASSTER).

As insurance that the request does not go astray prior to assignment of a control number, an information copy of the letter of transmittal could be provided to Headquarters, Department of the Army, Office of the Chief of Research and Development, Attention: CRDSTN, Washington, D.C. 20310.

You, industry, now know how to get the results of your efforts into this process. Your move!

Industrial Defense, Disaster Planning Courses Offered

The schedule of classes for the Industrial Defense and Disaster Planning for Privately Owned and Operated Facilities Course, FY 1971, has been confirmed. The five-day, tuition-free course will be given to industry and government executives at the Army Military Police School, Fort Gordon, Ga.

Reporting dates are Dec. 13, 1970; Feb. 28, 1971; March 21, 1971; and May 16, 1971.

The course will provide a working knowledge of planning measures to safeguard industrial facilities from hostile or destructive acts.

Subjects will include the industrial defense program, natural disasters, nuclear weapons, mutual aid, disaster control operations, emergency communications, industrial physical security planning, corporate survival, and disaster plan test. Also covered will be legal aspects of civil disturbance, and planning for civil disturbances.

Priority will be given to executives of private facilities participating in the DOD Industrial Defense Program, and to government personnel whose duties include national emergency, mobilization, or disaster planning. No security clearance will be required.

Accommodations have been arranged at a local motel. Daily transportation will be provided.

Executives whose facilities participate in the DOD Industrial Defense Program should send their applications to the Army Headquarters that conducts surveys of the programs at their facilities. Other industrial representatives and Federal, state and local government officials should apply to: The Provost Marshal General, Department of the Army, ATTN: PMGS–D, Washington D.C. 20314.

Guided Bomb Program Moved to ADTC

Guided bomb programs, directed by the Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio, have been transferred to the Armament Development and Test Center (ADTC), Eglin AFB, Fla. Both ASD and ADTC are elements of the Air Force Systems Command.

DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of August 1970.

DEFENSE SUPPLY AGENCY

17—The Defense Personnel Support Center, Philadelphia, Pa., is issuing the following contracts for men's field cold-weather coats:
- ***Alpha Industries, Inc.**, Knoxville, Tenn. $1,027,143. 200,978 coats. DSA 100-71-C-0180.
- ***John Ownbey Co., Inc.**, Knoxville, Tenn. $1,230,273. 238,425 coats. DSA 100-71-C-0181.

18—**J. P. Stevens and Co., Inc.**, N.Y., N.Y. $1,067,472. 672,000 white cotton bed sheets. Seneca and Clemson, Oconee County, S.C. Defense Personnel Support Center, Philadelphia, Pa. DSA 100-71-C-0182.

28—The Defense Fuel Supply Center, Alexandria, Va., issued the following contracts for fuel oil and gasoline for delivery in New York, New Jersey and Pennsylvania:
- ***Ace Fuel Oil Corp.**, Brooklyn, N.Y. $1,042,183. DSA 600-71-D-0320.
- **Agway, Inc.**, Syracuse, N.Y. $1,952,293. DSA 600-71-D-0321.
- **American Oil Co.**, Chicago, Ill. $1,318,981. DSA 600-71-D-0315.
- **Texaco, Inc.**, Long Island City, N.Y. $1,021,513. DSA 600-71-D-0375

31—**Rebmar, Inc.**, Corezal, P.R. $2,027,710. 260,113 rucksacks. Bayamon, P.R., and Morovis Industries, Morovis, P.R. Defense Personnel Support Center, Philadelphia, Pa. DSA 100-71-C-0230.

DEPARTMENT OF THE ARMY

5—***E. E. Anderson and Co., Inc.**, Roswell, N.M. $1,828,530. Construction of an operational apron, arm-disarm pad and two taxiways, Luke AFB, Ariz. Army Engineer District, Los Angeles, Calif. DA-CA09-71-C-0010.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—*Small Business Firm — Company —Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting Agency — Contract Number.

—**Tampa Ship Repair and Dry Dock Co., Inc.**, Tampa, Fla. $1,445,254. Annual repairs to Corps of Engineers seagoing dredge. Army Engineer District, Jacksonville, Fla. DA-CW17-71-C-0017.

6—***Holloway and Son Construction Co., Inc.**, Middletown, Ky. $3,336,607. Relocation of approximately 8.9 miles of Kentucky highways 1274 and 1240, and Morgan County road 1009A, for the Cove Run Reservoir Project, Menifee and Rowan Counties, Ky. Army Engineer District, Louisville, Ky. DA-CW27-71-C-0015.

7—***James L. Ferry and Son**, Sacramento, Calif. $1,139,695. Bank protection construction, Sacramento River Protection Project, Sacramento and Yolo Counties, Calif. Army Engineer District, Sacramento, Calif. DA-CW05-71-C-0021.

—***Paz Brothers, Inc.**, Bridgeport, N.J. $1,281,007. Construction of seven disposal areas on the Inland Waterway, Chesapeake and Delaware Canal, Del. Army Engineer District, Philadelphia, Pa. DA-CW61-71-C-0026.

10—**Eugene Luhr and Co. and Potasknick Dredging, Inc.**, (joint venture), Columbia, Ill. $11,207,300. Excavation of approximately seven miles of navigation channel, Kaskaskia River Navigation Project, St. Clair County, Ill. Army Engineer District, St. Louis, Mo. DA-CW33-71-C-0021.

—**Gregg, Gibson and Gregg, Inc.**, Leesburg. Fla. $1,975,576. Construction of an earth dike and a two-way reinforced concrete spillway with manually controlled, hydraulically operated vertical lift gates, Inglis Reservoir. DA-CW17-71-C-0020. $9,283,331, Construction of railroad and highway bridges; relocation of trackage and roads to provide clearance for the canal. DA-CW17-71-C-0019. $1,445,261. Construction of 14.2 miles of bank protection along the canal, Citrus and Levy counties. DA-CW17-71-C-0021. All above contracts are in connection with the Cross Florida Barge Canal Project. Army Engineer District, Jacksonville, Fla.

11—**Xerox Corp.**, Pasadena, Calif. $1,000,000. Classified services. Army Electronics Command, Fort Monmouth, N.J.

—***R. W. Mier Construction Co.**, Denver, Colo. $1,278,850. Construction of a three-story administration building, Peterson Field, Colorado Springs, Colo. Army Engineer District, Omaha, Neb. DA-CA45-71-C-0023.

12—**Honeywell. Inc.**, Hopkins, Minn. $2,026,048 (contract modification). Production of metal parts for PDM551 fuzes. Twin Cities Army Ammunition Plant, New Brighton, Minn. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA-AA09-70-C-0104.

13—***Edward J. Troise, Sr., and EJT Construction Co., Inc.** (joint venture), Glenside, Pa. $3,607,000. Construction of a supply warehouse and administration office, and a flyaway kit warehouse, Dover AFB, Del. Army Engineer District, Baltimore, Md. DA-CA31-71-C-0011.

14—**Lockheed Electronics Co.**, Plainfield, N.J. $8,119,606. Scientific engineering, technical and support services for the continued operation, maintenance and future development of the electromagnetic environmental test facility, Fort Huachuca, Ariz. and vicinity, for three years beginning Sept. 1, 1970. Fort Huachuca, Ariz. DA-EA18-71-C-0012.

17—***A. G. Proctor Co., Inc.**, Aurora, Colo. $1,331,440. Construction of recreational facilities, Beltzville Reservoir, Lehighton, Pa. Army Engineer District, Philadelphia, Pa. DA-CW61-71-C-0027.

—***Arnold M. Diamond, Inc.**, Great Neck. N.Y. $1,224,214. Construction of a steel bulkhead, Point Pleasant Canal, N.J. Army Engineer District, Philadelphia, Pa. DA-CW61-71-C-0024.

—***D. R. Allen and Son, Inc.**, Fayetteville, N.C. $1,050,086. Expansion for 100 rail cars for the north rail holding yard, Sunny Point Army Terminal, N.C. Army Engineer District, Savannah, Ga. DA-CA21-71-C-0010.

—The Army Engineer District, Los Angeles, Calif., issued the following contracts:
- ***Cardan Co., Inc.**, Los Angeles, Calif. $1,638,400. Construction of 3 180-man dormitories, George AFB, Victorville, Calif. DA-CA09-71-C-0018.
- ***William J. Zapp**, Colton, Calif. $1,146,020. Construction of concrete apron pavement, Norton AFB, Calif. DA-CA09-71-C-0017.

18—**Hughes Tool Co.**, Culver City, Calif. $1,260,000. Tear down and repair 42 crash-damaged OH-6A aircraft. El Segundo, Calif. Army Aviation Systems Command, St. Louis, Mo. DA-AJ01-68-A-0017.

19—**S and S Constructors**, Lancaster, Calif. $6,969,696. Construction of a composite building housing 1,638 men plus classroom, battalion headquarters and five support buildings, Ft. Huachuca, Ariz. Army Engineer District, Los Angeles, Calif. DA-CA09-71-C-0011.

—***Joseph N. Daugherty, Inc.**, Little Rock, Ark. $1,591,081. Construction of a composite medical facility, Blytheville AFB, Ark. Army Engineer District, Fort Worth, Tex. DA-CA63-71-C-0028.

20—***H. M. Carlton Construction Corp.**, Houston, Texas. $4,463,960. Construction of approximately 2,772 linear feet of flood wall and closure structures for the Hurricane Flood Protection Project, Texas City, Galveston County, Texas. Army Engineer District, Galveston, Texas. DA-CW64-71-C-0010.

—**Raytheon Co.**, Bedford, Mass. $2,865,313 (contract modification). Development of the SAM-D weapon. Army Missile Command, Huntsville, Ala. DA-AH01-67-C-1995.

24—The Army Engineer District, New Orleans, La., is awarding the two following contracts for levee enlargement, land and floodway side berms, East Atchafalaya Basin Protection Levee, Iverville Parish, La:
- **Houston-New Orleans, Inc.**, Belle Chasse, La. $1,375,429. DA-CW29-71-C-0022.
- **Great Lakes Dredge and Dock Co.**, New Orleans, La. $2,057,342. DA-CW29-71-C-0023.

25—**Hughes Aircraft Co.**, Culver City, Calif. $1,514,555. Advance development of a solid state ballistic computer for the M60A1 tank. Army Weapons Command, Rock Island Arsenal, Rock Island, Ill. DA-AA25-71-C-0078.

—**Owens-Illinois, Inc.**, Pittsburgh, Pa. $1,011,500. Four cinetheodolites and support equipment to record moving target positions. Army Electronics Command, Fort Monmouth, N.J. DA-AB07-71-C-0018.

—**Thiokol Chemical Corp.**, Woodbine, Georgia. $8,096,400. Loading, assembling and packing of 81mm, illuminating, M301-A3 cartridges. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA-AA09-71-C-0009.

26—***Kandy, Inc.**, Texarkana, Texas. $5,838,744. Construction work, Carter's Dam, Coosawattee River, Murray County, Ga. Army Engineer District, Mobile, Ala. DA-CW01-71-C-0014.

—***N. R. Hamm Contractor, Inc.**, Perry, Kan. $1,775,299. Road relocation and public use development, Melvern Reservoir, Osage River, Osage County, Kan. Army Engineer District, Kansas City, Kan. DA-CW51-71-C-0018.

—**LTV Corp.**, Warren, Mich. $2,623,000. Retrofitting Lance missile ground support equipment. Army Missile Command, Redstone Arsenal, Huntsville, Ala. DA-20-113-AMC-01052(Z).

27—**FMC Corp.**, San Jose, Calif. $30,288,194. M113 vehicles. Army Tank Automotive Command, Warren, Mich. DA-AE07-69-C-2600.

28—**Federal Cartridge Corp.**, Minneapolis, Minn. $32,213,651 (contract modification). Operation of 5.56mm, M193 and 7.62mm small arms production facility, Twin Cities Army Ammunition Plant, Minneapolis, Minn. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA-36-038-AMC-01099(A).

—***Ronal Industries, Inc.**, Port Chester, N.Y. $2,348,988. Winterizing M561/M792 1¼ ton trucks. Army Tank Automotive Command, Warren, Mich. DA-AE07-71-C-0030.

—**General Motor Corp.**, Anderson, Ind. $1,411,330. 61,982 12 volt storage batteries. Anaheim, Calif. Army Tank Automotive Command, Warren, Mich. DA-AE07-71-C-1380.

—**General Research Corp.**, Santa Barbara, Calif. $1,833,500. Data processing system analysis for the Advance Ballistic Missile Defense Agency. Army Safeguard System Command, Huntsville, Ala. DA-HC60-71-C-0015.

—**Marathon Battery Co.**, St. Paul, Minn. $2,967,300. 630,000 dry batteries and associated test equipment. Procurement Div., Army Electronics Command, Philadelphia, Pa. DA-AB05-71-C-4324.

31—**General Dynamics Corp.**, Rochester, N.Y. $1,769,478. 480 teletypewriter radios. Orlando, Fla. Army Electronics Command, Philadelphia, Pa. DA-AB05-68-C-0035.

—The Army Missile Command, Huntsville, Ala., issued the following contracts:

Raytheon Co., Andover, Mass. $20,978,775. FY 1970/1971 Improved Hawk ground support equipment. DA-AH01-71-C-0796. $26,242,505. Improved Hawk missile for FY 1970 and 1971. Andover and **Red** River Army Depot, Texarkana, Tex. DA-AH01-71-C-0795.

Western Electric Co., New York, N.Y. $1,048,630 (contract modification). Research and development for the Safeguard Acquisition Perimeter Radar. Syracuse, N.Y. $7,667,720 (contract modification). Site and installation engineering material and checkout of the Tactical Softwear Control Site. Bell Telephone Labs, Whippany, N.J. DA-30-069-AMC-00333(Y).

—The Army Ammunition Procurement and Supply Agency, Jolliet, Ill., issued the following contracts for MTSQ M564 fuze metal parts:

McGraw Edison Co., Bristol, Conn. $6,338,170. DA-AA09-71-C-0014.

General Time Corp., La Salle, Ill. $3,296,609. Peru, Ill. DA-AA09-71-C-0015.

—The following contracts were awarded by the Army Engineer District, Mobile, Ala.:

General Electric Co., Pensacola, Fla. $3,531,335. Design, manufacture, test, installation and field testing of two 131,579 KVA/185,000 horsepower generator motors, Carter's Dam, Murray County, Ga. Schenectady, N.Y., and Ga. DA-CW01-71-C-0017.

***Allbritton-Williams, Inc.**, Tallahassee, Fla. $1,457,612. Construction of 3 three story dormitories, Eglin AFB, Fla. DA-CA01-71-C-0015.

DEPARTMENT OF THE NAVY

4—**Hughes Aircraft Co.**, Culver City, Calif. $10,000,000 (contract modification). Incremental funding for the Phoenix missile. Culver City, El Segundo, Torrance and Fullerton, Calif., and Tucson, Ariz. Naval Air Systems Command, Washington, D.C. N00019-67-C-0240.

—**Hughes Aircraft Co.**, Fullerton, Calif. $24,300,000. Engineering development of a target acquisition system for the Improved Point Defense Surface Missile System, and other shipboard self-defense weapons. Naval Ordnance Systems Command, Washington, D.C. N00017-70-C-4415.

6—**Dyson and Co.**, Pensacola, Fla. $7,076,927. Construction of recruit barracks, Naval Training Center, Orlando, Fla. Naval Facilities Engineering Command, Washington, D.C. N62467-68-C-0349.

—**Whittaker Corp.**, Saugus, Calif. $2,640,000. Mk 24 Mod 4 aircraft parachute flares. Naval Ships Parts Control Center, Mechanicsburg, Pa. N00104-71-C-A001.

—**Northrop Corp.**, Newbury Park, Calif. $2,959,210. Preproduction Mk 30 Mod O mobile antisubmarine warfare target vehicles. Naval Ordnance Systems Command, Washington, D.C. N00017-70-C-1434.

—**Pratt and Whitney Aircraft Div., United Aircraft Corp.**, East Hartford, Conn. $2,710,144. Spare parts for the F-14 aircraft's YTF-30-P412 engines. Naval Aviation Supply Office, Philadephia, Pa. N00383-06-A-7015-0001.

7—**North American Rockwell Corp.**, Anaheim, Calif. $4,132,900. Refurbishment and modification of nine Ship Inertial Navigation Systems. Navy Ship Systems Command, Washington, D.C. N00024-71-C-5022.

—**Honeywell Inc.**, Minneapolis, Minn. $4,243,224 (contract modification). Rockeye II components. N00019-70-C-0140. $1,516,792 (contract modification). Special tooling and test equipment for the Rockeye II. N00019-70-C-0086. Naval Air Systems Command, Washington, D.C.

—**Grumman Aerospace Corp.**, Bethpage, Long Island, N.Y. $11,300,000 (contract modification). Long lead time items to support FY 1971 procurement of A-6E aircraft. Naval Air Systems Command, Washington, D.C. N00019-69-C-0075.

10—**Lockheed Aircraft Corp.**, Burbank, Calif. $20,000,000 (contract modification). Incremental funding for continued engineering development of the S-3A weapon system. Naval Air Systems Command, Washington, D.C. N00019-69-C-0385.

—**Lockheed Missile and Space Co.**, Sunnyvale, Calif. $3,447,090. Engineering services to increase viability and effectiveness of existing Fleet Ballistic Missile re-entry system. N00030-71-C-0062. $1,700,000. Poseidon C-3 surface support equipment, missile test and readiness equipment, missile containers and liners. N00030-71-C-0068. Naval Strategic Systems Project Office, Washington, D.C.

11—**Sperry Rand Corp.**, Syosset, N.Y. $2,080,000. Approximately 13,000 man-days of technical assistance for the Poseidon (C-3) Logistics Support Program. Naval Ship Systems Command, Washington, D.C. N00024-71-C-5060.

—**Raytheon Co.**, Sudbury, Mass. $20,000,000. Poseidon guidance system electronics assemblies and associated components. Naval Strategic Systems Project Office, Washington, D.C. N00030-71-C-0046.

—**Lockheed Electronics Co.**, Plainfield, N.J. $7,200,000 (contract modification). Production of the Mk 86, a new computer-oriented gun fire control system. Naval Ordnance Systems Command, Washington, D.C. N00017-71-C-4204.

12—**Treadwell Corp.**, N.Y., N.Y. $2,437,500. Overhaul of oxygen generators for nuclear submarines. Naval Shipyard, Portsmouth, N.H. N00102-71-C-0272.

—**Texas Instruments, Inc.**, Dallas, Texas. $4,340,128 (contract modification). Incremental funding for the design, development and fabrication of AN/APS-116 radar sets for S-3A aircraft. Naval Air Systems Command, Washington, D.C. N00019-70-C-0398.

13—**Hughes Aircraft Co.**, Fullerton, Calif. $8,567,700. Weapon Control Console Mk 81, Mod 0 and Signal Data Converter Mk 73, Mod 0 for fire control systems. Naval Ordnance Systems Command, Washington, D.C. N00017-C-70-1424.

14—**Sundstrand Corp.**, Belvidere, Ill. $1,355,703. Five-axis, numerically controlled machining centers with tool changes. Navy Purchasing Office, Washington, D.C. N00600-70-C-1227.

—**General Electric Co.**, Phoenix, Ariz. $2,760,139. Automatic data processing equipment for GE's 600 series system for use at the Naval Avionics Facility, Indianapolis. Ind. Navy Automatic Data Processing Equipment Selection Office, Washington, D.C. N66032-71-L-0003.

—**Kaman Aerospace Corp.**, Bloomfield, Conn. $3,756,773 (contract modification). Conversion of UH-2A/B helicopters to an HH-2D configuration. Naval Air Systems Command, Washington, D.C. N00019-70-C-0051.

—Naval Strategic Systems Project Office, Washington, D.C., issued the following:

Bendix Corp., Teterboro, N.J. $7,604,695. Manufacture and repair of Poseidon inertial components. N00030-71-C-0090.

Honeywell, Inc., St. Petersburg, Fla. $4,008,412. Manufacture and repair of Poseidon inertial components. N00030-71-C-0091.

Interstate Electronics Corp., Anaheim, Calif. $1,165,000. Logistics Services in support of fleet ballistic missile test instrumentation. N00030-71-C-0063. $1,293,000. Engineering services in support of Poseidon test and evaluation program. N00030-71-C-0064.

17—The Naval Air Systems Command, Washington, D.C., issued the following contract modifications:

Hughes Aircraft Co., Culver City, Calif. $2,500,000. Increase of limitation of authorization for F-14 armament system development and evaluation testing. N00019-70-C-0343.

LTV Aerospace Corp., Dallas, Tex. $12,769,400. Long lead time items for FY 1971 A-7E aircraft. N00019-68-C-0075. $41,552,137. Long lead time items in support of FY 1971 A-7D aircraft for the Air Force. N00019-67-C-0143.

General Electric Co., Shenectady, N.Y. $22,445,000. Naval nuclear propulsion research, development and related work. N00024-70-C-5027.

18—The Naval Ship Systems Command, Washington, D.C. issued the following contracts:

Sperry Rand Corp., St. Paul, Minn. $1,771,883. Programming for the development and integration of the submarine (SSN-688) combat central computer system. N00024-71-C-1000.

Vitro Corp. of America, Silver Spring, Md. $1,352,805. Planning and engineering studies, analyses, reviews and evaluations for the SSN and SSBN submarine programs. N00024-71-C-0213.

Newport News Shipbuilding and Dry Dock Co., Newport News, Va. $3,746,729 (contract modification). Long lead-time materials and equipment for nuclear-powered guided missile frigate, DLGN-38. N00024-70-C-0252 P00001.

19—**Grumman Aerospace Corp.**, Bethpage, N.Y. $183,600,000 (contract modification). Installment funding for F-14A aircraft for the Navy. Naval Air Systems Command, Washington, D.C. N00019-69-C-0422.

—**Lasko Metal Products, Inc.**, West Chester, Pa. $7,836,094. Bomb fins, Mk 15 Mod 3. Ship Parts Control Center, Mechanicsburg, Pa. N00104-71-C-A012.

—The Naval Facilities Engineering Command, Washington, D.C., awarded the following contracts:

Higgerson-Buchanan, Inc., Chesapeake, Va. $1,529,488. Construction of Aerial Gunnery Range Improvements at the Marine Corps Air Station, Cherry Point, N.C. N62470-69-C-0867.

R. D. Lambert and Son, Inc., Chesapeake, Va. $1,368,931. Construction of a cleaning and corrosion treatment building, Navel Air Rework Facility, Norfolk, Va. N62470-70-C-0800.

20—**Simplex Wire and Cable Co.**, Portsmouth, N.H. $2,726,900. Manufacture of oceanographic cable. Naval Electronics Command, Washington, D.C. N00039-71-C-0301.

21—**Hughes Aircraft Co.**, Los Angeles, Calif. $8,598,168 (contract modification). 15C8A and 15C9 missile control trainers for F-14A aircraft weapon system. Naval Training Device Center, Orlando, Fla. N61339-70-C-0255.

—**Granite Construction Co.**, Watsonville, Calif. $4,780,000. Construction of a taxiway apron access, apron loading, water mains and roads, Travis AFB, Fairfield, Calif. Naval Facilities Engineering Command, Washington, D.C. N62474-70-C-0141.

—**Hughes Aircraft Co.**, Culver City, Calif. $1,759,449. Services and materials for work on the Forward Looking Infra-Red sub-system for the Night Observation Gunship (YOV-10D). Naval Regional Procurement Office, Los Angeles, Calif. N000123-70-C-1848.

24—**Northrop Corp.**, Norwood, Mass. $1,141,227. Repair of 127 GL-V7 gyroscopes. Naval Ship Systems Command, Washington, D.C. N00024-71-C-5027.

—**Christenson-Raber-Kief and Associates, Inc.**, Seattle, Wash. $2,466,400. Construction of a barracks and mess hall, Naval Station, Adak, Alaska. Naval Facilities Engineering Command, Washington, D.C. N62476-70-C-0095.

—**General Electric Co.**, West Lynn, Mass. $18,400,000 (contract modification). Engineering development of the TF-34 turbofan engine for the S-3A aircraft. Naval Air Systems Command, Washington, D.C. N00019-68-C-0443.

25—The Naval Strategic Systems Project Office, Washington, D.C., issued the following contracts:

General Electric Co., Washington, D.C. $6,048,945. Research and development of fire control systems for the Poseidon fleet ballistic missile program. Pittsfield, Mass. N00030-C-0166.

Honeywell Inc., St. Petersburg, Fla. $1,227,564. Repair of Polaris inertial components. N00030-71-C-0013.

—**Grumman Aerospace Corp.**, Bethpage, N.Y. $21,000,000 (contract modification). Long lead time items for the EA-6B aircraft. Naval Air Systems Command, Washington, D.C. N00019-67-C-0078.

26—The Naval Automatic Data Processing Equipment Selection Office, Washington, D.C. is issuing the following contract actions for replacement of peripheral components to IBM computer systems:

Potter Instrument Co., Inc., Plainview, N.Y. $5,811,635. N66032-71-C-0002.

California Computer Products, Inc., Anaheim, Calif. $4,443,595. N66032-71-C-0003.

Memorex Corp., Santa Clara, Calif. $3,669,480. N66032-71-C-0001.

Ampex Corp., Culver City, Calif. $1,334,088. N66032-71-C-0004.

—**Raytheon Co.**, Portsmouth, R.I. $1,957,774. Two AN/BQS-12 sonar systems. Naval Ship Systems Command, Washington, D.C. N00024-70-C-1325.

27—**Lockheed Aircraft Corp.**, Burbank, Calif. $20,000,000 (contract modification). Installment funding for the S-3A aircraft. N00019-69-C-0385. $1,348,306. Reliability testing of various P-3C aircraft avionics equipment. N00019-70-C-0610. Naval Air Systems Command, Washington, D.C.

31—**Hughes Aircraft Co.**, Los Angeles, Calif. $2,270,000. Design data and long lead time items for one missile control officer trainer for F-14A weapons systems device 1509. Naval Training Device Center, Orlando, Fla. N61339-70-C-0255.

—**Gary Aircraft Corp.**, San Antonio, Tex. $1,166,025 (contract modification). Complete overhaul of R-3350-32WA engines, including all components and accessories. Naval Air Systems Command, Washington, D.C. N00019-70-C-0434.

DEPARTMENT OF THE AIR FORCE

3—**Chromalloy American Corp.**, San Antonio, Tex. $1,256,811. Repair services for vane and shroud assemblies of the J-57 engine, Oklahoma City Air Materiel Area, AFLC, Tinker AFB, Okla. F41608-70-D-0212.

—**McDonnell Douglas Corp.**, Long Beach, Calif. $35,820,694. Nine C-9A aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33657-68-C-0081.

4—**General Electric Co.**, Bethesda, Md. $1,922,883. Rental of electronic data processing equipment for FY 1971. Offut AFB, Neb. Base Procurement Div., Offut AFB, Neb. F25600-71-M-0649.

—**Rand Corp.**, Santa Monica, Calif. $6,000,000. Aerospace power studies and research. Office of Scientific Research, AFSC, Arlington, Va. F44620-67-C-0045.

—**Westinghouse Electric Corp.**, Baltimore, Md. $1,600,000. Flexible turret system for the B-57G aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33615-71-C-1009.

5—**General Electric Co.**, Arkansas City, Ark. $1,214,093. Overhaul and modification of aircraft engines. San Antonio Air Materiel Area, AFLC, Kelly AFB, Tex. F34601-69-D-3250.

—**IBM Corp.**, Washington, D.C. $2,256,972. Rental of automatic data processing equipment for FY 1971. Offut AFB, Neb. Base Procurement Div., Offut AFB, Neb. F25600-71-M-0659.

6—**TRW, Inc.**, Redondo Beach, Calif. $16,153,090. Non-development support for the Minuteman weapon system program. Norton AFB, Calif. F04701-70-C-0166. $5,221,773. Development support for the Minuteman weapon system program. F04701-70-C-0165. Space and Missile Systems Organization, AFSC, Los Angeles, Calif.

—**Lockheed Aircraft Corp.**, Marietta, Calif. $9,626,822. C-5A aircraft spare parts. Detachment 31, San Antonio Air Materiel Area, AFLC, Marietta, Ga. AF33(657)-15053.

7—**McDonnell Douglas Corp.**, St. Louis, Mo. $1,300,650. Modification kits for F-4C, F-4D, F-4E, and RF-4-C aircraft. Robertson, Mo. Ogden Air Material Area, AFLC, Hill AFB, Utah. F4601-69-A-2245.

10—The Space and Missile Systems Organization, AFSC, Los Angeles, Calif., issued the following contracts:

The Boeing Co., Seattle, Wash. $4,858,683. Design, development, study and test programs for Minuteman missiles. F04701-69-C-0153.

Aerojet General Corp., Sacramento, Calif. $2,740,393. Titan III B/C/D Stage I and II liquid rocket engine systems. F04701-70-C-0095.

—**ITT Electro Physics Labs Inc.**, Hyattsville, Md. $1,315,000. Fabrication of a transportable high frequency transmitter facility. Rome Air Development Center, AFSC, Griffiss AFB, N.Y. F30602-71-C-0014.

—**Bendix Corp.**, Teterboro, N.J. $1,441,744. Automatic test system used in conjunction with the testing of F-4 aircraft systems. Ogden Air Material Area, AFLC, Hill AFB, Utah. F42650-71-C-0016.

11—**Hayes International Corp.**, Birmingham, Ala. $6,025,114. Inspection, repair and modification of KC-135 aircraft for FY 1971. Oklahoma City Air Material Area, AFLC, Tinker AFB, Okla. F34601-68-C-3607.

—**Lockheed Aircraft Corp.**, Marietta, Ga. $1,079,613. Aerospace ground equipment for C-5A aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. AF33(657)-15053.

—**Hughes Aircraft Co.**, Canoga Park, Calif. $3,143,000. Components for the Falcon missile. Tucson, Ariz. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33657-69-C-1014.

13—**Lockheed Aircraft Corp.**, Marietta, Ga. $1,209,326. C-5A aircraft spare parts. Detachment 31, San Antonio Air Materiel Area, AFLC, Marietta, Ga. AF (657)-15053.

14—**Lockheed Aircraft Corp.**, Marietta, Ga. $50,000,000. Allotment of funds, C-5A contract. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. AF 33(657)-15053.

—***Wolverine Diesel Power Co.**, Detroit, Mich. $1,366,477. Diesel generator sets, type A/M32A-60A. Traverse City, Mich. Sacramento Air Materiel Area, AFLC, McClellan AFB, Calif. F04606-70-D-0039.

—The following contracts were issued by the Electronics Systems Division, AFSC, L. G. Hanscom Field, Mass.:

RCA, Moorestown, N.J. $1,925,000. Radar equipment. F19628-67-C-0209.

***Sierra Research Corp.**, Buffalo, N.Y. $1,250,000 (contract modification). Supplies and services for a hurricane research program. F19628-70-C-0293.

—The Space and Missile Systems Organization, AFSC, Los Angeles, Calif., has awarded the following contracts:

Tracor Inc., Austin, Texas. $8,154,027. Mk 1A penetration aids applicable to the Minuteman II weapon system. F04701-70-C-0153.

The Boeing Co., Seattle, Wash. $19,580,000. Force modernization of the Minuteman weapon system. F04701-68-C-0042.

19—**International Harvester Co.**, San Diego, Calif. $1,952,707. A/E 24-U-8 turbine driven generators. Sacramento Air Material Area, AFLC, McClellan AFB, Calif. F04606-68-D-0643.

—**General Dynamics Corp.**, Fort Worth, Tex. $1,572,936. Supplemental agreement to a contract for F-111A aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. AF33 (657)-13403.

—**Collins Radio Co.**, Dallas, Tex. $1,030,613. Electronics communications equipment, C-8500. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701-68-C-0095.

20—**Philco-Ford Corp.**, Newport Beach, Calif. $3,380,407. Target designator equipment for F-4D aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33657-70-C-0345.

—**Honeywell Inc.**, Minneapolis, Minn. $1,954,984. Supplies and services for the modification of F-101 series aircraft. Ogden Air Materiel Area, AFLC, Hill AFB, Utah. F34601-69-A-2584.

21—**General Electric Co.**, Cincinnati, Ohio. $27,500,000. Spare parts applicable to the J-79 turbojet aircraft engine. Oklahoma City Air Materiel Area, AFLC, Tinker AFB, Okla. F34601-71-D-0026.

25—**Lockheed Aircraft Corp.**, Marietta, Ga. $2,504,793. Spare parts for the C-5A aircraft. Detachment 31, San Antonio Air Materiel Area, AFLC, Marietta, Ga. AF33(657)15053.

—**General Dynamics Corp.**, Fort Worth, Tex. $191,297,000. Completion of funding for billing price adjustment on the F-111 program. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. AF33(657)13403, Change Order No. 423.

—The Space and Missile Systems Organization, AFSC, Los Angeles, Calif., is issuing the following contracts:

Thiokol Chemical Corp., Briston, Pa. $3,315,000. Stage I motors for Minuteman III. F0471-69-C-0197.

Lockheed Aircraft Corp., Sunnyvale, Calif. $12,060,148. Operation and maintenance of the Vandenberg tracking station and the satellite test annex. F04701-70-C-0013.

Philco-Ford Corp., Palo Alto, Calif. $12,353,383. Operation and maintenance of Air Force satellite control facility tracking stations. New Boston, N.H., and overseas. F04701-70-C-0014.

Change Your Address?

The Defense Industry Bulletin's mailing list is computer printed. To make changes of address as quickly as possible, we must have your present mailing label. To change your address: fill in your new address at right (company name must be included), clip out this box with your label on the reverse side, and mail it to Defense Industry Bulletin, Defense Supply Agency, Cameron Station, Alexandria, VA. 22314.

Please do no mark or alter the label on the reverse side. Allow two months for change.

Name

Company

Dept., Mail Stop or Code

Street Address

City **State** **ZIP**

Cut Here

Lockheed Aircraft Corp., Sunnyvale, Calif. $6,391,033. Operation and maintenance of Air Force satellite control facility tracking stations at Kaena Point, Hawaii and Chiniak Point, Alaska. F04701-70-C-0012.

Philco-Ford Corp., Palo Alto, Calif. $4,855,121. Logistic support management of the Air Force satellite control facility. F04701-70-0006.

26—The Oklahoma Air Material Area, AFLC, Tinker AFB, Oklahoma, issued the following contracts:

Collins Radio Co., Dallas, Tex. $1,380,000. To engineer, furnish and install a voice/data multiplex system, Vandenberg AFB. F34601-70-C-3349.

The Boeing Co., Wichita, Kan. $1,652,400. Development of a prototype modification kit for D, G, and H models of B-52 aircraft. F34601-70-C-2772.

27—**Lockheed Aircraft Corp.**, Marietta, Ga. $1,658,218. C-5A aerospace ground equipment. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. AF33(657)-15053.

—**Sanders Associates, Inc.**, Bedford, Mass. $1,508,304. Airborne ordnance fuzes. Armament Development and Test Center, AFSC, Eglin AFB, Fla. F33657-68-C-0658.

—**Martin Marietta Corp.**, Denver, Colo. $30,822,112. Design, development, fabrication and delivery of Titan III-D space booster and associated aerospace ground equipment. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04695-67-C-0041.

28—The Ogden Air Materiel Area, AFLC, Hill AFB, Utah, issued the following contracts for Minuteman III weapon system equipment:

The Boeing Co., Seattle, Wash. $1,646,244. Trainer test set equipment. F04606-70-A-70084.

Radiation, Inc., Melbourne, Fla. $1,027,932. Electronic programmer assemblies. F09603-A-1444.

—The Space and Missile Systems Organization, AFSC, Los Angeles, Calif., issued the following contracts:

Radiation, Inc., Melbourne, Fla. $1,028,755. Electronic equipment. Palm Bay, Fla. F04701-70-C-0251.

Avco-Everett Research Laboratory, Everett, Mass. $1,342,949. Scientific direction of the Advanced Research Projects Agency Mt. Haleakala Optical Station program. Wailuku, Maui, Hawaii. F04701-69-C-0212.

—**General Dynamics Corp.**, Fort Worth, Tex. $1,255,580. F-111 aircraft spare parts. Sacramento Air Materiel Area, AFLC, McClellan AFB, Calif. AF33(657)-13403.

31—**Hughes Aircraft Co.**, Culver City, Calif. $1,250,566. An advanced interceptor armament system. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33615-70-C-1364.

Centrifuge Tests Inertial Guidance Systems

Addition of a large centrifuge now allows precise, controlled testing of inertial guidance systems at the Air Force Systems Command's Missile Development Center, Holloman AFB, N.M.

An unusually exact, precisely known acceleration is called for in the development, test, and evaluation of inertial guidance systems. The large centrifuge meets this need. It can provide prolonged periods of high gravity acceleration and can exactly repeat all acceleration levels. These are essential features that rocket sled and laboratory bench tests cannot offer.

A unique feature of this system is a counter rotating platform, upon which inertial navigation systems are mounted for testing. Fixed at one end of the large arm of the centrifuge, the platform turns at the same speed as the arm, but in the opposite direction. Thus, the platform, while under high g forces, remains oriented in a fixed direction or bearing (azimuth). Undesirable effects of angular velocity which result from normal centrifuge testing are eliminated, and drift information can be obtained from guidance systems.

The distance from the center of the large arm of the centrifuge to the center of the counter rotating platform is 260 inches, making it the largest centrifuge in the Air Force. The centrifuge was designed to achieve a maximum acceleration of 100 gs.

New System Speeds Inertial Guidance Tests

Design studies for a system for accurate inflight evaluation of inertial navigation systems are being sponsored by the Central Inertial Guidance Test Facility at Holloman AFB, N.M. The Completely Integrated Reference Instrumentation System (CIRIS) will basically eliminate the need for ground-based radars and computers in testing inertial guidance systems.

CIRIS consists of an inertial navigation platform, a radio ranging device, a digital computer, a digital tape recorder, and a real time reference. The radio ranging device, the most important component, consists of an interrogator on the plane and a small transponder on the ground. Elapsed time between the transmission of a signal from the interrogator to the transponder and back again determines the location of the aircraft in relation to the transponder. The location of the transponder is precisely known, and the performance of the system being tested can be determined by comparing data from the system and CIRIS.

The transponder is portable, allowing tests to be conducted anywhere in the United States.

Evaluation of inertial guidance systems can now be accomplished in minimal time, without the need to wait for post-flight reduction of radar data.

Defense Industry Bulletin
Defense Supply Agency
Cameron Station, Alexandria, Va. 22314

Defense Supply Agency
Official Business

UNIVERSITY OF FLORIDA
3 1262 09683 3511

POSTAGE AND FEES PAID
Defense Supply Agency

FLARE

When requesting address change, send this mailing label. Do not alter or deface.

Space Chamber Adapted for Rocket Plume Studies

An improved cryopumping capacity and advanced instrumentation have given a space chamber at Arnold Engineering Development Center (AEDC) the capacity for research into plume technology.

The 42-by-82 foot vacuum chamber contains more than 113,000 cubic feet of space. With the changes, altitude conditions of more than 300,000 feet can be maintained for appreciable periods during rocket motor firing.

The main modification has been to increase the chamber's cryopumping capacity with an open-ended cylinder 18 feet in diameter and 18 feet tall. Liquid hydrogen flows through the outer wall of the cylinder and both gaseous and liquid helium circulate through the core. The cylinder is suspended vertically from the roof of the chamber with its open end facing the exhaust nozzle of the test rocket motor mounted near the floor. The expanded cryopumping capacity also improves altitude conditions that can be maintained during non-combustion testing.

Another major change is the installation of a circular support structure covering nearly the full diameter of the chamber. Instrumentation is attached to cross members to map plume fields as the rig is raised and lowered above the rocket motor.

Design, fabrication, and installation of the additional equipment in the chamber, part of the Aerospace Environmental Facility at AEDC, was done by personnel of ARO, Inc., contract operator of the testing center. The hardware can be readily removed when the chamber is to be used for normal environmental testing.

Plume technology involves the study of rocket motor exhaust effects. Among the exhaust effects being studied are contamination, heating, effects on flight vehicle stability, and electrical interference created by high temperature plume gases. For example, at high speeds in space, exhaust gases from large rocket motors can creep up the sides of the missile itself, creating undesirable forces on aft control surfaces and subjecting the base of the missile to heating effects. Also, the size and shape of a trailing plume can affect flight characteristics of missiles or rockets, while hot gases can interfere with guidance and control signals from the ground.

For several years, all four major testing divisions at AEDC have conducted tests related to some aspect of plume technology. Among major programs that have benefited from these tests have been Saturn, Minuteman, Nike-Zeus, and Manned Orbiting Laboratory.

With the modification of the space chamber, AEDC engineers have a valuable tool for still broader and more detailed studies.

AEDC is part of Air Force Systems Command, Arnold AFS, Tenn.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1970 434-570/3